

MONITORING REGIONAL PROGRESS ON ADDRESSING ANTIMICROBIAL RESISTANCE IN THE WHO SOUTH-EAST ASIA REGION

**Analysis report of results
of three rounds of AMR
National Self-Assessment
Surveys (2016–2017,
2017–2018, 2018–2019)**



REGIONAL OFFICE FOR

**World Health
Organization**
South-East Asia

Monitoring regional progress on addressing Antimicrobial Resistance in the WHO South-East Asia Region

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Abbreviations

AMR	antimicrobial resistance
AMS	antimicrobial stewardship
AMSP	Antimicrobial Stewardship Programme
AMU	antimicrobial use
API	active pharmaceutical ingredient
DRA	Drug Regulatory Authority
ESBL	extended-spectrum beta lactamases
FAO	the Food and Agriculture Organization of the United Nations
GAP	Global Action Plan
GAP-AMR	Global Action Plan on Antimicrobial Resistance
GLASS	Global Antimicrobial Resistance Surveillance System
IPC	infection prevention and control
M&E	monitoring and evaluation
NAP	national action plan
NAP-AMR	National Action Plan on Antimicrobial Resistance
NGO	nongovernmental organization
NRA	national regulatory authority
OIE	the World Organization for Animal Health
TrACSS	Tripartite AMR Country Self-Assessment Survey
SEAR	South-East Asia Region (of WHO)
UNEP	United Nations Environment Programme
WASH	water, sanitation and hygiene
WHA	World Health Assembly (of WHO)
WHO	World Health Organization



Foreword



Across the world, antimicrobial resistance (AMR) already kills an estimated 700 000 people annually, including 230 000 from multidrug-resistant tuberculosis. By 2050, unless urgent action is taken, AMR is expected to kill 10 million annually. AMR is a global crisis that threatens the future of our most precious drugs: antibiotics. AMR is a complex problem that affects all of society and its threat to animal, human health and agriculture is well known. Coordinated action among human, animal health and environmental sectors is of importance. The World Health Organization is working closely with the Food and Agriculture Organization of the United Nations (FAO) and the World Organization for Animal Health (OIE) in a multisectoral and “One Health” approach to take collective action to minimize the emergence and spread of AMR while promoting best practices, including optimal use of antibiotics in both human and non-human sectors.

The leadership and technical support play a crucial role in implementing effective action plans at global and national levels. The actions to be taken in implementing effective response to reduce the overuse and misuse of antibiotics in human, animal health and agricultural sectors require coordinated task force. All Member States have developed a national multi-sectoral action plan to address AMR. The task force on AMR has central role in offering assistance, and coordinating collaboration for Member States’ national multisectoral action plans.

As part of the response on World Health Assembly resolution number WHA.72(5), WHO, FAO, and OIE developed National Self-Assessment Survey (TrACSS) with structured variables around objectives of Global Action Plan on AMR. Participation of countries of the South-East Asia Region has shown 100% response rates in three waves of TrACSS (2016–2017, 2017–2018, 2018–2019). TrACSS is pivotal to map current situation, progress level, and challenges in addressing AMR. In addition, it is intended to encourage further improvement on the AMR containment. WHO is committed to support all Member States in developing and implementing National Action Plan on AMR. Using the information from TrACSS data will capture the country stage to stimulate effective and sustainable multisectoral response on AMR.

A handwritten signature in black ink, reading 'P. Khetrpal'.

Dr Poonam Khetrpal Singh
Regional Director
WHO South-East Asia Region



Executive summary

The Global Tripartite Self-Assessment Survey of country progress in addressing antimicrobial resistance (AMR) is a component of a broader approach in monitoring and evaluation of the global action plan on AMR[1] and mapping the extent to which progress has been made at regional and country levels. This report analysed the results of three rounds of Tripartite AMR Country Self-Assessment Surveys (TrACSS) in the WHO South-East Asia (SEA) Region for 2016–2017, 2017–2018 and 2018–2019.

The World Health Assembly resolution number WHA72.5 urges Member States to develop or strengthen monitoring systems that will contribute to the annual antimicrobial resistance country self-assessment survey administered by the Tripartite and to participate in the Global Antimicrobial Resistance Surveillance System (GLASS), and to use this information to improve implementation of the national action plans[2].

TrACSS has been developed and run by the three Tripartite organizations (Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE) and World Health Organization (WHO)) and reflects progress in both human and non-human sectors. All 11 WHO Member States in the SEA Region participated in the three rounds of surveys that have been conducted with 100% response rates.

The development and implementation of a National Action Plan on Antimicrobial Resistance (NAP-AMR) will be more robust if all countries of the SEA Region have effective monitoring and financial arrangements. The synchronization of NAP-AMR with other existing action plans such as human immunodeficiency virus (HIV), tuberculosis (TB), malaria and neglected tropical diseases (NTDs) could support sustainable response to AMR. On the other hand, there has been considerable progress on NAP-AMR among countries of the SEA Region with large agricultural sectors. Ensuring that all sectors (both human and non-human) play their part will be important to achieve further progress and participation in supporting global and regional/national actions to address AMR.

The multisectoral working group was identified in the Global Action Plan on Antimicrobial Resistance (GAP-AMR) as an important facilitator of “One Health” approaches in addressing AMR. The number of countries of the SEA Region that have multisectoral working groups, which are not only functional but also have defined and clear activities and funding, increases every year. This data showed that progress in multisectoral and One Health collaboration/coordination among countries of the SEA Region has been made and sustained, especially the extent of involvement of the human health and animal health sectors in the development and implementation of NAP-AMR. Countries of the SEA Region with a large multisectoral working group are more likely to have made higher progress on NAP-AMR as well as reflect maturity and a greater level of investment in the programmes.

Progress on awareness and understanding of AMR risks and responses in human health and animal health among the countries of the SEA Region is higher than other sectors such as food production, food safety, plant health and the environment. All countries of the SEA Region have targeted AMR awareness campaigns and most of those countries have covered some pre-service and in-service training for human health; but there has been lesser coverage of tailored ad hoc AMR



training for non-human sectors. However, countries of the SEA Region have strengthened capacity gaps in veterinary services with regular AMR training and some of them have carried out regular performance monitoring.

On the other hand, data sharing and surveillance systems are one of the key elements to address AMR through GAP-AMR Objective-2. Progress to strengthen the knowledge and evidence base has been made by most countries of the SEA Region through having national monitoring and surveillance systems in both human and non-human sectors.

Countries of the SEA Region that have effective integration of laboratories in AMR surveillance are more likely to have made significant progress on standardization and harmonization of procedures, relevance of diagnostic techniques, and data management. However, few countries of the SEA Region have multisectoral working groups or coordination committees responsible for reviews of national AMR strategies based on data on antimicrobial consumption and resistance.

Countries of the SEA Region with large multisectoral working groups are also more likely to have made more progress on reducing the incidence of infection through national infection prevention and control (IPC) programmes, effective good health management and hygiene practices, and effective sanitation and infection prevention measures. In this GAP-AMR objective, selected health facilities have also implemented the guidelines, with monitoring and feedback system in place. Progress has been made on good health, management and hygiene practices to reduce the use of antimicrobials and minimize development and transmission of AMR in animal production (terrestrial and aquatic), as well as reducing the development and transmission of AMR in food processing.

The GAP-AMR calls upon all countries to conserve antimicrobial effectiveness by ensuring the provision of antimicrobial stewardship programmes, removing incentives that encourage antimicrobial overuse, and implementing policies and regulations to preserve antimicrobial effectiveness[1]. Progress on optimizing the use of antimicrobial medicines in human, animal and plant health has been made by most countries of the SEA Region. Some countries of the SEA Region have policies on prescription and sale of antimicrobials as well as implementation of national antimicrobial stewardship programmes both in human and non-human sectors. Regionally, countries of the SEA Region with large multisectoral working groups are more likely to have made more progress on optimizing antimicrobial use in human health compared with non-human sectors.

Progress on risk assessment for AMR transmission in the environment is classified on the basis of whether high-risk locations have been identified and whether risk reduction actions are underway. While progress on legislation and/or regulations to mitigate risk are grouped into specific actions based on whether they can impact AMR and whether they have a functioning system for monitoring compliance and enforcement.

Countries with large multisectoral working groups are more likely to have made more progress towards several GAP-AMR objectives and NAP-AMR implementation indicators. However, without robust data, research and policy efforts to tackle AMR may be compromised. No country had a platform for sharing AMR data across sectors[1,3]. More progress on data collection systems on animal health, plant health, food production, food safety and environment were required to support existing monitoring and surveillance systems, although steady progress was being achieved on antimicrobial



use data intended for use in animal health. Besides, other substantial data related to the NAP-AMR implementation indicators also need to be improved to better understand and inform the extent of AMR intervention and action plan implementation on addressing AMR.

As this is a self-assessment survey, it is possible that some countries reported progress in a positive perspective. However, where joint external evaluations (JEE) have been held, scores have been compared and found to be broadly consistent with what has been reported in this survey. Responses of all countries will be published in an open access database, offering the scope for in-country review with civil society and other stakeholders. Countries should also work to ensure that their national monitoring and surveillance data are disseminated through global data-sharing platforms, in line with their commitments in the GAP-AMR, and to support global and regional action. It also encourages countries to not only develop multisectoral working groups but also action and investment to ensure that progress in both human and non-human sectors can be enhanced[1,3,4].



Introduction

Antimicrobial resistance (AMR) is a grave threat to human health and economic development[5]. An estimated 10 million deaths annually may be attributed to AMR by 2050 at the global level. Of these, nine million are likely to be in developing countries, with 4.7 million in Asia, 4.2 million in Africa and 392 000 in Latin America[3]. The overuse and misuse of antimicrobials in humans, animals and plants has accelerated the natural evolutionary processes by which microbes become resistant to antimicrobial treatments. Today, some infections have even been rendered untreatable by existing antimicrobials. Projections suggest that AMR is likely to exacerbate global economic inequality, with the economic costs disproportionately affecting poorer countries.

Regarding the animal sector, the World Bank has projected significant decreases in international trade due to AMR because of the fall in the trade of livestock and livestock products. AMR could also derail the achievement of the Sustainable Development Goals, driving an estimated 24 million people into extreme poverty[6] and potentially resulting in tens of millions of deaths[5].

Antimicrobial effectiveness is a global public good and must be protected by public authorities. Yet, two of the biggest risks to containing AMR are: 1) AMR policies that may not be feasible over decades, and 2) historic divisions between human health and other sectors that hinder efforts to contain resistance[6]. Long-term commitments are needed in monitoring, surveillance, antimicrobial stewardship, and training to bring substantial change in patterns of antimicrobial use [7] and in how waste and effluents are managed. A One Health approach – incorporating humans, animals, plants and the broader environment – is needed to ensure adequate action [8]. Given the need to coordinate action among these sectors, government engagement is imperative. The necessary changes to global antimicrobial use can be achieved using individually targeted behaviour change strategies.

Member countries of the Region are at different stages in responding to the growing threat posed by AMR. The Global Action Plan on Antimicrobial Resistance (GAP-AMR) was adopted in 2015 by all countries through decisions adopted by the World Health Assembly of WHO, the Governing Conference of the Food and Agriculture Organization of the United Nations (FAO), and the World Assembly of the World Organization for Animal Health (OIE) [9–11]. All countries approved the GAP-AMR and agreed to develop and implement national action plans on AMR (NAP-AMR) by 2017.

The importance of AMR in public health was reaffirmed in 2016 at the United Nations General Assembly, where Heads of State committed their countries to work together to address AMR and implement the GAP-AMR. The UN General Assembly also called upon WHO, FAO, OIE, regional and multilateral development banks, UN agencies and civil society organizations to support the

development and implementation of national action plans and AMR activities at the national, regional and global levels [1]. This has been done through the development of One Health tools and training materials [12].

The World Health Assembly has also called on WHO, FAO, OIE and other relevant partners to develop a framework for monitoring and evaluation to assist with the achievement of GAP Principle #5. As part of their response, WHO, OIE and FAO created a national self-assessment surveys containing questions structured around the objectives of the GAP. Resolution WHA72.5 urges Member States to develop or strengthen monitoring systems that will contribute to the annual antimicrobial resistance country self-assessment surveys administered by the Tripartite and to participate in the Global Antimicrobial Resistance Surveillance System (GLASS), as well as to use this information to improve the implementation of their national action plans [2]. The first wave of this survey was sent to the 194 Member States of WHO in late 2016 and the findings were reported to the World Health Assembly and the OIE World Assembly of Delegates.

Non-human health sectors (animal health, plant health, food production, food safety and the environment) were separated in the survey questions, some questions were made more specific, and the bar was raised on some indicators [1]. As such, only a limited number of questions can be compared between 2016–2017, 2017–2018 and 2018–2019. Countries were asked to submit a single official response, validated by all sectors involved, summarizing their national progress. The survey database from those three waves are available at <http://www.who.int/antimicrobial-resistance/global-action-plan/database/en/>.

The Tripartite (WHO, FAO and OIE) has developed a draft approach for monitoring and evaluation of the GAP-AMR. The purpose of this global monitoring is to review and summarize country progress in implementing key actions to address AMR, to report annually at the global level. It is also intended to encourage national-level reviews of country progress and help identify priorities for the next steps. The country responses will also be used to guide follow-up actions and identify areas where assistance and support is required. This will help to provide a picture of the stage a country has reached in building an effective and sustainable multisectoral response to AMR. It may also stimulate discussions at the country level on how to enhance progress. [13–15]

WHO is committed to support all Member States in developing and implementing their national action plans for AMR. The main strategic actions by WHO include providing advocacy, capacity-building and technical assistance, as well as supporting resource mobilization and leveraging other resources and partnerships. The WHO South-East Asia Region supported the development of NAPs that are aligned with the World Health Assembly-endorsed GAP-AMR. The Region is committed to monitor the implementation of and progress made by NAPs through AMR situation analysis and regional monitoring of progress on addressing AMR. The Regional Office has established baseline data for national AMR control programmes to measure progress [4].

It was agreed that the regional Tripartite partners and UNEP will continue to support the implementation of NAPs-AMR in Member States by providing evidence-based technical guidance customized for each country. Going forward, the momentum thus achieved will be sustained through stronger multisectoral collaboration, including the creation of platforms that can enable joint planning, exchange of surveillance information and sharing of resources [3].



In this report, we analyse and compare responses of countries to the first (2016–2017), second (2017–2018), and third (2018–2019) wave of the Tripartite survey and describe the trends and current level of regional and country progress (based on self-assessment) on AMR among WHO Member States in the South-East Asia Region. We convey progress achieved towards the goals of the GAP at the regional level among SEA Region countries. Finally, we explore progress in relation to key food-producing countries to examine whether the presence of a strong agricultural sector impacts progress made towards One Health goals at the regional and national level.

It is also important to note that although the survey did allow countries to report separately on animal health, plant health, food safety, food production and the environment for some questions, many countries chose just to report on the non-human sectors collectively. For this reason, in some cases comparison is made between the human health sector and the non-human health sectors collectively.



Survey participation

The number of countries that responded to the Tripartite National Self-Assessment Survey (TrACSS) increased from 149 in 2016–2017 to 154 in 2017–2018 and 159 in 2018–2019; covering 82% (2018–2019) of WHO Member countries and representing more than 91.3% (2017–2018) of the world's population. This report focuses on analysing TrACSS data in the South-East Asia Region for 2016–2017, 2017–2018 and 2018–2019.

All WHO Member States in the SEA Region participated in the three waves of surveys that have been conducted, with 100% response rate. A detailed methodology for this analysis is presented in Appendix 1. The response rates for each survey question varied as some countries were able to provide data from more sectors than others; “no response” was treated as its own category throughout the analysis; and mapping of indicators for progress monitoring and implementation is available in Appendix 3.

Table 1: Details of countries participating in the National Self-Assessment Survey (2016–2017, 2017–2018, 2018–2019)

Category	Survey respondents						WHO Member State representation (%)		
	2016–2017		2017–2018		2018–2019		2016–2017	2017–2018	2018–2019
	n	%	n	%	n	%			
Countries	149		154		159		76.8%	79.4%	82%
WHO Region									
African Region (AFR)	25	16.8%	29	18.8%	31	19.5%	54.3%	63.0%	67.4%
Americas Region (AMR)	24	16.1%	28	18.2%	29	18.2%	68.6%	80.0%	82.9%
Eastern Mediterranean Region (EMR)	17	11.4%	17	11%	18	11.3%	77.3%	77.3%	81.8%
European Region (EUR)	52	34.9%	50	32.5%	50	31.4%	98.1%	94.3%	94.3%
South-East Asia Region (SEAR)	11	7.4%	11	7.1%	11	6.9%	100%	100%	100%
Western Pacific Region (WPR)	20	13.4%	19	12.3%	20	12.6%	74.1%	70.4%	74.1%

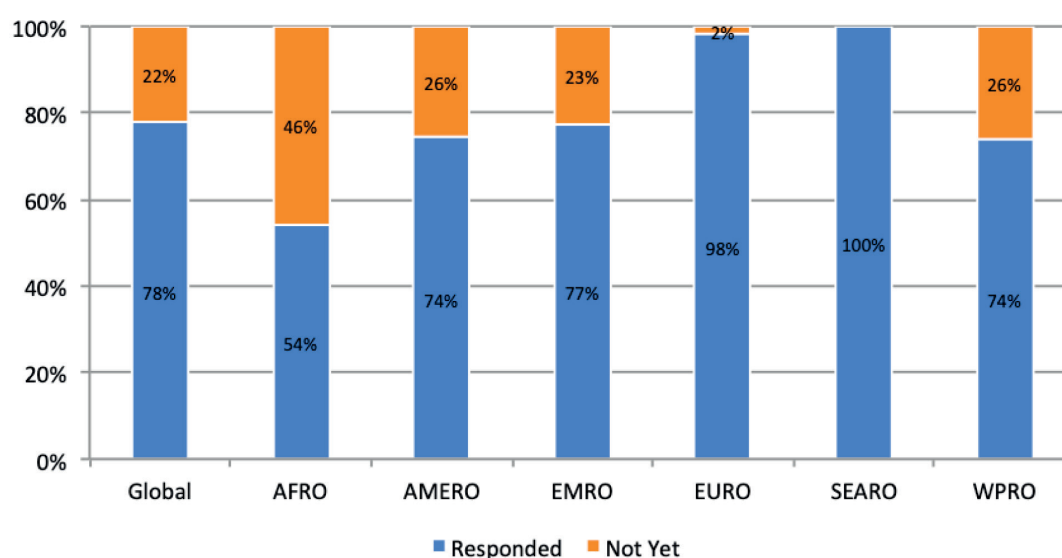


Category	Survey respondents						WHO Member State representation (%)		
	2016–2017		2017–2018		2018–2019		2016–2017	2017–2018	2018–2019
	n	%	n	%	n	%			
G20 country									
G20 country among WHO region			41	26.6%					
Not G20 country among WHO region			113	73.4%					
G20 country among SEA Region			2	18.2%					
Not G20 country among SEA Region			9	81.8%					
Income group									
High-income country (HIC)			50	32.5%				64.9%	
Upper-middle-income country (UMIC)			44	28.6%				78.6%	
Lower-middle-income country (LMIC)			40	26%				75.5%	
Lower income country (LIC)			19	12.3%				61.3%	

Total number of WHO Member States is 194. Number of WHO Member States from each region: 47 in African (AFR) Region, 35 in Region of the Americas (AMR), 21 in Eastern Mediterranean Region (EMR), 53 in European Region (EUR), 11 in South-East Asia Region (SEAR) and 27 in the Western Pacific Region (WPR), as per http://www.who.int/choice/demography/by_country/en/. Total number of WHO Member States per WB income group include: 77 in HIC, 56 in UMIC, 53 in LMIC and 31 in LIC, as per <https://data.worldbank.org/country>.

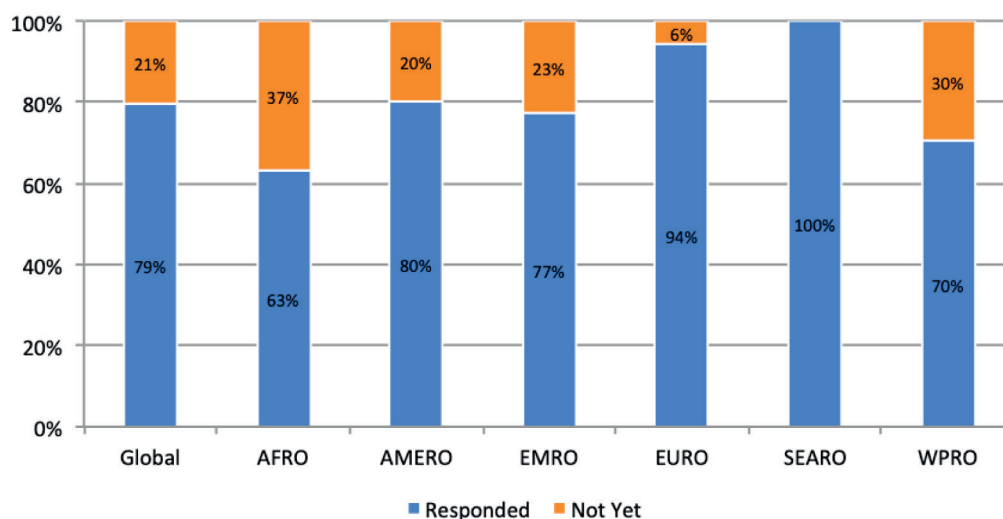
Globally, around 78% of all countries (2016–2017) have responded to the Tripartite National Self-Assessment Survey. All countries in the South-East Asia Region responded to the first wave (2016 –2017) of national self-assessment surveys.

Figure 1: Participating countries in the Tripartite National Self-Assessment Survey (2016–2017)



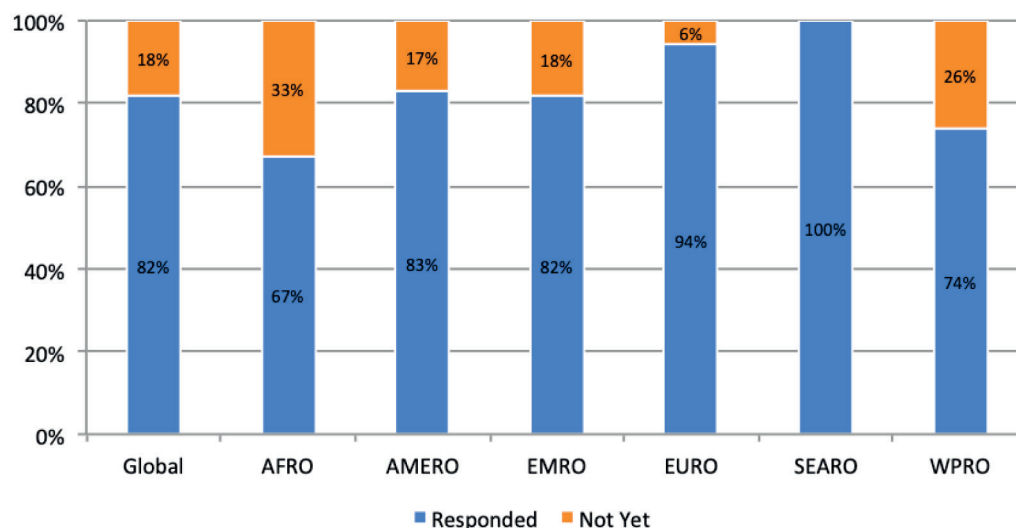
Globally, around 79% of countries (2017–2018) have responded to the Tripartite National Self-Assessment Survey. All countries in the SEA Region responded to the second wave (2017–2018) of the National Self-Assessment Survey.

Figure 2: Participating countries in the Tripartite National Self-Assessment Survey (2017–2018)



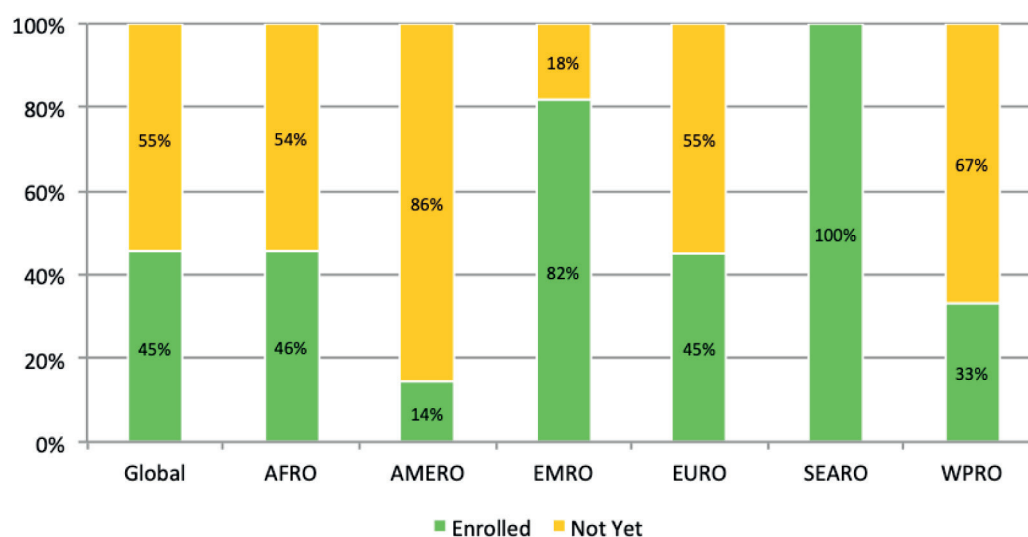
Globally, around 82% of countries (2018–2019) have responded to the Tripartite National Self-Assessment Survey. All countries in the SEA Region responded to the third wave (2018–2019) of the National Self-Assessment Survey.

Figure 3: Participating countries in the Tripartite National Self-Assessment Survey (2018–2019)



Globally, around 45% of all countries (2018–2019) have been enrolled with the Global Antimicrobial Resistance Surveillance System (GLASS). All countries of the South-East Asia Region have enrolled with GLASS.

Figure 4: Participating countries in the Global Antimicrobial Resistance Surveillance System (2018–2019)



Development of national action plans

Obtaining a complete and comprehensive operational plan with adequate budgeting will remain a challenge for years to come across the region [4]. Globally, 60.4% of countries have developed NAP-AMR. Among them, 26% had obtained government approval for the plan and created monitoring arrangements (i.e. Level D), while 12.3% had identified funding and all relevant sectors involved (i.e. Level E). Countries have clearly made substantial progress on developing and implementing national action plans since the first wave of the survey and many countries strengthened their management of AMR [1].

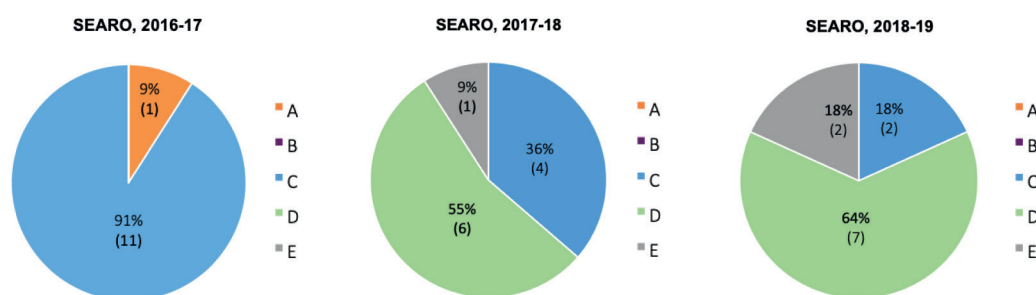
Regionally, all countries (100%) in the SEA Region have developed NAP-AMR. Among them, in 2018–2019, 64% had obtained government approval for the plans and created monitoring arrangements (i.e. Level D), while 18% had identified funding and all relevant sectors involved (i.e. Level E).

3.1 Regional progress

One of the key challenges faced by countries relates to having in place effective operational plans and regulatory frameworks that could be suitably adapted to AMR containment efforts. Most countries are yet to put together a strategic research agenda that is relevant to current policies and programmes, and address implementation challenges facing AMR containment efforts [3]. Regionally, progress with development of NAP-AMR has been made in most countries. NAP-AMRs must have an operational and monitoring plan not only approved by the government but also funding sources identified. In the implementation of NAP-AMR, the involvement of relevant sectors in defined monitoring and evaluation processes in place has also increased.



Figure 5: Regional progress in the development of national action plans on AMR (2016–2017, 2017–2018, 2018–2019)



A = No national AMR action plan.

B = National AMR action plan under development.

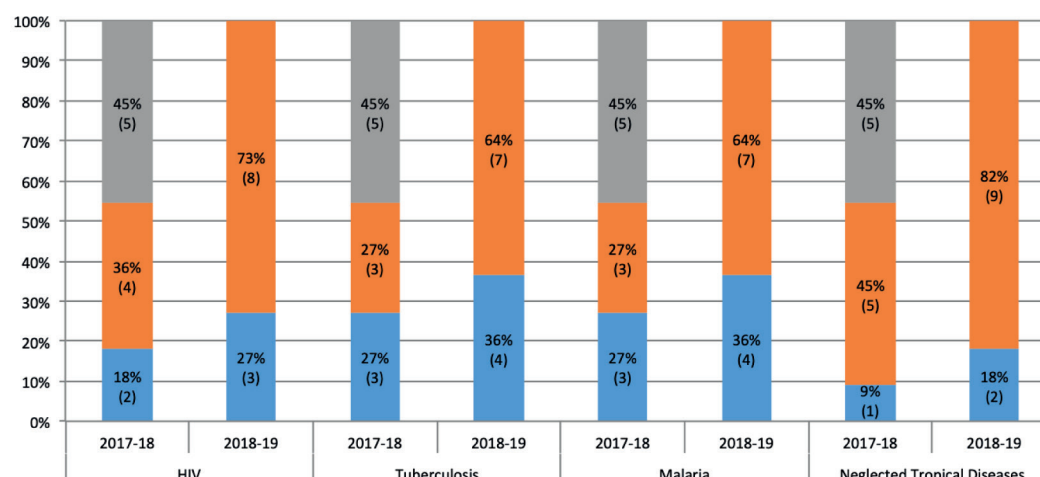
C = National AMR action plan developed.

D = National AMR action plan approved by government that reflects Global Action Plan objectives, with an operational plan and monitoring arrangements.

E = National AMR action plan has funding sources identified, is being implemented and has relevant sectors involved with a defined monitoring and evaluation process in place.

Antimicrobials include a wide range of products including antibiotics, antifungals, and medicines for HIV, TB and malaria. For human health, the responses should focus on antibiotics and monitor efforts to minimize the spread of resistance to these critical medicines. This is because many countries are at an early stage of developing a sustainable response to antibiotic resistance. In contrast, many countries that are affected by HIV, TB and malaria have already prepared plans and made some progress towards addressing resistance as part of those disease programmes [13–15]. Regionally, progress of NAP-AMR that links to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases, has been achieved and enhanced. Although there are a number of NAP-AMRs that have not yet been linked, all the NAP-AMRs have been identified in the last year, thus indicating that progress has been made in planning between relevant sectors.

Figure 6: Regional progress of NAP-AMR linked to existing action plans, strategies and targets (2017–2018, 2018–2019)



For animal health the responses should cover the antimicrobial classes listed in the OIE list of antimicrobial agents [EE1] of veterinary importance. For plant health, responses should focus on bactericides (antibiotics) and fungicides [13–15]. In the context of this information, the explanations will be further discussed in relation to strengthening veterinary services (as part of Strategic Objective 1); national monitoring system for antimicrobials intended to be used in animals (sales/use) and for pesticide use in plant production (as part of Strategic Objective 2); good health, management and hygiene practices to reduce the use of antimicrobials and minimize development and transmission (as part of Strategic Objective 3); and optimizing antimicrobial use (as part of Strategic Objective 4).

3.2 Country progress

All countries have made progress with the development of their NAP-AMR [Appendix 2]. In 2018–2019, almost all the NAP-AMR have been approved by the governments with an operational and monitoring plan (Level D). Moreover, the implementation process of NAP-AMR in two of the 11 SEA Region Member States have identified sources of funding which involves relevant sectors (Level E) in the defined monitoring and evaluation process [Table 12–13].

On the other hand, progress towards the development of national action plans appears robust in those countries with large agricultural sectors. Globally, among the top ten chicken-, pork- and cattle-producing countries that responded to the AMR survey, nine of the 10 have in the least developed a national action plan (Level C–E) [1]. In the SEA Region, progress of NAP-AMR has been made by the top five meat-producing countries (chicken-pig-cattle) that responded to the surveys for 2016–2017, 2017–2018 and 2018–2019. Some of the top 5 meat-producing countries have achieved only stagnant progress in Level C (2017–2018, 2018–2019) that is a cause for concern.

Figure 7: Progress of NAP-AMR among the top five meat-producing countries (2016–2017, 2017–2018, 2018–2019)

	Chicken			Pig			Cattle		
	2016-17	2017-18	2018-19	2016-17	2017-18	2018-19	2016-17	2017-18	2018-19
Level E	N/A	Thailand	Thailand	N/A	Thailand	Thailand	N/A	Thailand	N/A
Level D	N/A	India, Indonesia, Myanmar	Bangladesh, India, Indonesia, Myanmar	N/A	India, Indonesia, Myanmar	India, Indonesia, Myanmar	N/A	India, Indonesia, Myanmar	Bangladesh, India, Indonesia, Myanmar
Level C	Bangladesh, India, Indonesia, Myanmar, Thailand	Bangladesh	N/A	India, Indonesia, Myanmar, Thailand	DPRK	DPRK	Bangladesh, India, Indonesia, Myanmar, Thailand	Bangladesh	Nepal
Level B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Level A	N/A	N/A	N/A	DPRK	N/A	N/A	N/A	N/A	N/A

Based on livestock primary data for meat (chicken, pig, cattle) <http://www.fao.org/faostat/en/>; countries listed are among the top 5 SEA Region countries that responded to the Tripartite AMR Survey, and may not be among the top 5 countries globally

The progress of NAP-AMR that links to any other existing action plans, strategies or targets are still largely related to HIV, tuberculosis and malaria compared with neglected tropical diseases [Appendix 2]. The high level of progress with the development of NAP-AMR does not guarantee a high level of progress for NAP-AMR that links to any other related existing action plans. However, two of the 11 SEA Region Member States consistently have NAP-AMR that links with three other related existing action plans (i.e. HIV, tuberculosis and malaria) [Table 7,10].

As might be expected, there is also a strong relationship between quantitative measures of governance and having a national action plan in place (Level C–E). Countries demonstrating strong government effectiveness and performance – defined by the World Bank Development Research Group [16] as a positive perception of the quality of public and civil services, of policy formulation and implementation, and the government’s commitment to such policies – display four times the odds of having a national action plan after adjusting for country income group status [1].



Multisectoral approaches to addressing AMR

AMR is a complex and multisectoral issue that needs a higher level of governance structure. It is presumed that the latter condition is needed to govern the multisectoral coordination group comprising members from many different sectors [4]. Globally, the establishment of a multisectoral working group was identified in the GAP-AMR as an important facilitator of a One Health approach to addressing AMR [9].

Nonetheless, there has been less progress on this indicator than on the development of NAP-AMR [1]. Regionally, at least half or more of the responding SEA Region countries (2016–2017, 2017–2018) have established a multisectoral AMR working group, but those groups are not functioning yet (Level B). When added to the 9% of the SEA Region countries that have not yet established a working group (Level A), it is clear that substantial progress still has to be made to achieve this goal.

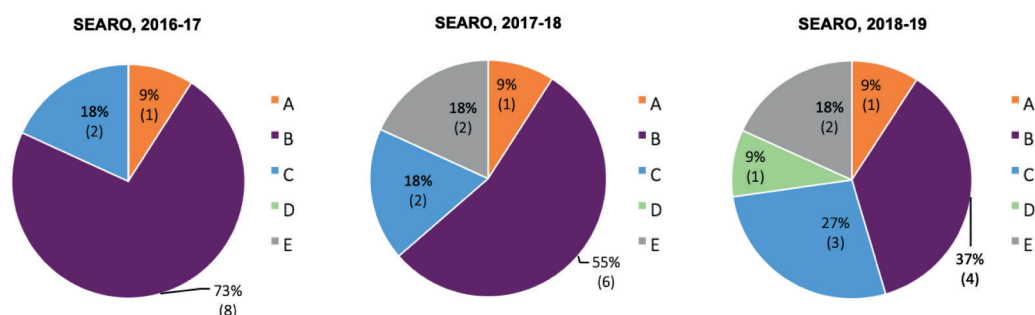
However, SEA Region countries have progressed in multisectoral and One Health collaboration/coordination to address AMR with functional multisectoral working groups (Level C-E) having nearly doubled from 27% of SEA Region countries (2016–2017) to 45% (2017–2018) and then to 63% (2018–2019).

4.1 Regional progress

Regionally, tangible progress in multisectoral and One Health collaboration/coordination to address AMR has been made. The number of multisectoral working groups that are functional with defined activities and funding (Level C) increased from 18% of the countries (2016–2017 and 2017–2018) to 27% (2018–2019). Moreover, integrated approaches to implement the NAP-AMR with relevant data and lessons learned (Level D-E) from all sectors (i.e. human health, animal health (terrestrial and aquatic), plant health, food production, food safety, and environment, including WASH) rose from no regional progress (2016–2017) to progress in 18% (2017–2018) and 27% of countries (2018–2019) respectively.



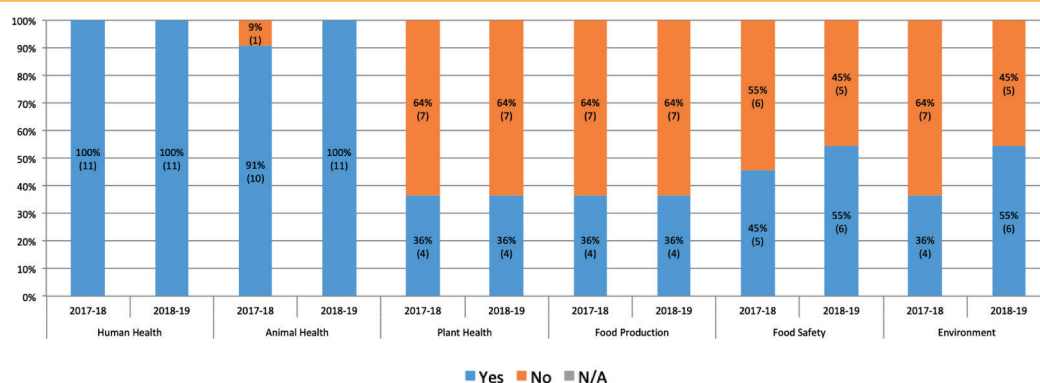
Figure 8: Regional progress in multisectoral and One Health collaboration/coordination (2016–2017, 2017–2018, 2018–2019)



- A = No formal multisectoral governance or coordination mechanism on AMR exists.
- B = Multisectoral working group(s) or coordination committee on AMR established with Government leadership.
- C = Multisectoral working group(s) is (are) functional, with clear terms of reference; regular meetings, and funding for working group(s). Activities and reporting/accountability arrangements are defined.
- D = Joint working on issues including agreement on common objectives.
- E = Integrated approaches used to implement the national AMR action plan with relevant data and lessons learned from all sectors used to adapt implementation of the action plan.

To support multisectoral and One Health collaboration/coordination, many multisectoral working groups are actively involved in developing and implementing the NAP-AMR. Working groups that have been established typically include representatives from human health (100% of countries in 2017–2018 and 2018–2019), animal health (from 91% in 2017–2018 to 100% in 2018–2019), food safety (from 45% in 2017–2018 to 55% in 2018–2019) and the environment sector (from 36% in 2017–2018 to 55% in 2018–2019). Representatives from other sectors such as food production and plant health (both 36% in 2017–2018, 2018–2019) are less frequently included.

Figure 9: Regional progress of involved sectors in developing and Implementing NAP-AMR (2017–2018, 2018–2019)



4.2 Country progress

Countries with large multisectoral working groups are also more likely to have a national action plan in place (Level C–E) [1]. Progress in multisectoral and One Health collaboration/coordination to address AMR has been made [Appendix 2]. Although the responding SEA Region countries (2016–2017, 2017–2018) have established multisectoral AMR working groups, those groups are not yet functioning (Level B): the proportion is reduced from 73% (2016–2017) to 55% (2017–2018) and 37% (2018–2019). There was significant country progress in 2018–2019, and it is worth noting that two of the 11 SEA Region countries consistently used integrated approaches to implement the NAP-AMR with relevant data and lessons learned (Level E) in 2017–2018 and 2018–2019 [Table 12–13].

Countries with large working groups (defined as including at least four sectors) appear to have made more progress towards several GAP-AMR objectives than those countries with smaller multisectoral working groups (defined as including 3 or fewer sectors) [1]. The sectors most actively involved in developing and implementing the NAP-AMR are human health and animal health, followed by food safety and the environment sector [Appendix 2]. Around seven of the 11 countries of the SEA Region have large working groups, especially in those four working group sectors [Table 5,7–10,12–13]

This finding may reflect the degree of national interest in AMR and interest in delivering national action plan goals leading to better performance; or it may reflect a recognition of the fact that investment and action across all sectors is necessary to achieve progress in any one sector. Interestingly, there is no correlation between the size of the agricultural sector as a percentage of GDP and the size of the countries' multisectoral working groups [1].



Improving awareness and understanding of AMR

Some sub-indicators can be considered in raising awareness and understanding of AMR, such as awareness campaigns for the public, and education and training strategies for professionals [4]. Globally, in terms of GAP objective 1, countries are more likely to have tailored AMR training courses (Level C–E) if they have a large multisectoral working group, and they are more likely to have AMR training and professional education available (Level C–E) in the veterinary sector.

Notably, there is no significant difference between these countries on the human AMR-awareness indicators [1]. However, regional progress on raising awareness and understanding of AMR risks and responses in human health have achieved Level C or a higher level among SEA Region countries. Progress in training and professional education on AMR in the human health sector in most countries have also reached Level C or higher. On the other hand, progress in non-human sectors are mostly at Level B and C.

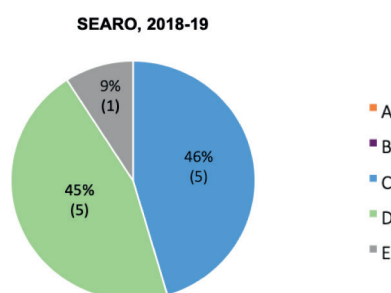
However, the progress of training and professional education on AMR with strengthening of veterinary services improved to Level C or higher. Countries of the SEA Region are more likely to achieve significant progress on raising awareness and understanding of AMR risks and responses if they involve related sectors or multisectoral working groups as the focus for activities.

5.1 Regional progress

Overall regional progress on raising awareness and understanding of AMR risks and responses has been achieved. In 2018–2019, all countries of the SEA Region have had limited or small-scale antimicrobial resistance awareness campaigns targeting some but not all relevant stakeholders (Level C). About 45% of these awareness campaigns have launched nationwide government supported antimicrobial resistance awareness campaigns targeting all or majority of relevant stakeholders (Level D). The targeted, nationwide government-supported activities to change the behaviour of key stakeholders (Level E) represents 9% of the campaigns.



Figure 10: Regional progress on awareness and understanding of AMR risks and response (2018–2019)



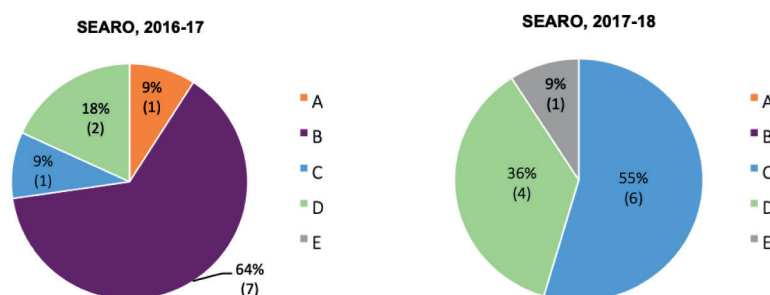
- A = No significant awareness-raising activities on relevant aspects of risks of antimicrobial resistance.
- B = Some activities in parts of the country to raise awareness about risks of antimicrobial resistance and actions that can be taken to address it.
- C = Limited or small-scale antimicrobial resistance awareness campaign targeting some but not all relevant stakeholders.
- D = Nationwide, government-supported antimicrobial resistance awareness campaign targeting all or the majority of relevant stakeholders, based on stakeholder analysis, utilizing targeted messaging accordingly within sectors.
- E = Targeted, nationwide government-supported activities implemented to change behavior of key stakeholders within sectors, with monitoring undertaken over the last 2–5 years.

Human sector

Raising awareness about AMR is a major goal of global guidance on AMR and is a key area of national action on AMR, particularly for human health [1]. Regionally, progress on raising awareness and understanding of AMR risks and responses in human health have been made. The number of countries that have limited or small-scale AMR awareness campaigns targeting some (but not all) relevant stakeholders (Level C) had increased from 9% (2016–2017) to 55% (2017–2018). Significant progress was made as most countries launched nationwide, government-supported campaigns on AMR awareness in human health (Level D), which increased from 18% (2016–2017) to 36% (2017–2018). As many as 9% of countries (2018–2019) already implemented strategies to change behaviour regarding AMR in target groups in human health (Level E).



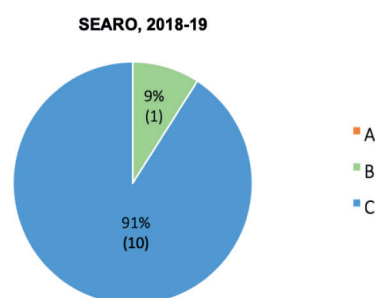
Figure 11: Regional progress on awareness and understanding of AMR in human health (2016–2017, 2017–2018)



- A = No significant awareness-raising activities on antibiotic resistance.
- B = Some activities in parts of the country to raise awareness about risks of antibiotic resistance and actions that can be taken to address it.
- C = Limited or small-scale antibiotic resistance awareness campaign targeting some, but not all, relevant stakeholders (e.g. general public, doctors, pharmacists, nurses, medicine sellers).
- D = Nationwide, government-supported antibiotic awareness campaigns targeting all or majority of stakeholders.
- E = Focused, national scale government-supported activities implemented to change behaviour regarding antibiotic resistance in target groups in human health, both public and private sectors, with monitoring undertaken of their awareness and behavior change over last 5 years.

On the other hand, regional commitment contributes to significant progress on raising awareness and understanding of AMR in human health: Around 91% of countries make the human health sector the focus for activities (Level C) on raising awareness and understanding of AMR risks and responses.

Figure 12: Regional progress on the extent of involvement of the human health sector (2018–2019)



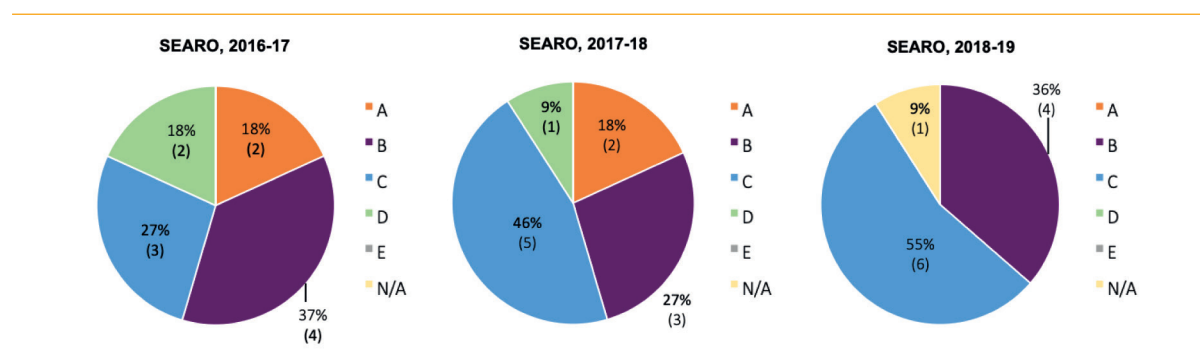
- A = This sector not involved
- B = Some activities done in this sector
- C = This sector is a main focus for activities

Regionally, progress has been achieved in training and professional education on AMR in the human health sector. Since 2018–2019, all countries have had training for human health workers on AMR. Countries that covered AMR in some pre-service training and in some in-service training or other continuing professional development (CPD) for human health workers (Level C) increased from 27% (2016–2017) to 46% (2017–2018) and 55% (2018–2019). AMR was covered in pre-service



training for all relevant cadres, and in-service training or other CPD covering AMR that is available for all types of human health workers nationwide (Level D) decreased from 18% in 2016–2017 to 9% in 2017–2018. Related data is not available for 2018–2019.

Figure 13: Regional progress of AMR training and professional education in human health (2016–2017, 2017–2018, 2018–2019)



- A = No training for human health workers on AMR.
- B = Ad hoc AMR training courses in some human health related disciplines.
- C = AMR is covered in 1) some pre-service training and in 2) some in-service training or other continuing professional development (CPD) for human health workers.
- D = AMR is covered in pre-service training for all relevant cadres. In-service training or other CPD covering AMR is available for all types of human health workers nationwide.
- E = AMR is systematically and formally incorporated in pre-service training curricula for all relevant human health cadres. In-service training or other CPD on AMR is taken up by relevant groups for human health nationwide, in public and private sectors.

Non-human sector

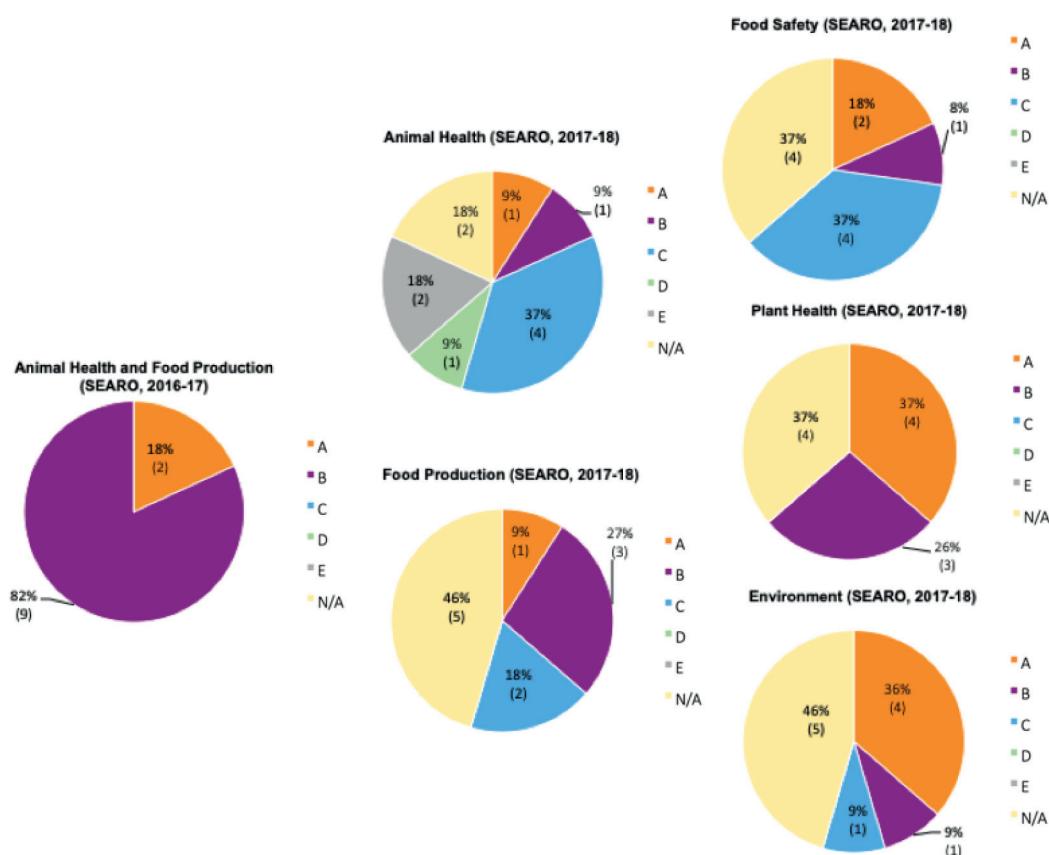
Raising awareness about AMR is not only related to human health, but also related to non-human sectors. Regionally, progress on raising awareness and understanding of AMR risks and responses in non-human health have been made, especially for animal health and food production. Some activities to raise awareness about the risks of antimicrobial resistance and related actions have been held (Level B) to address AMR in animal health, food production, plant health, food safety and the environment.

In 2017–2018, several countries also have limited or small-scale AMR awareness campaigns targeting some (but not all) relevant stakeholders (Level C) in animal health (37% of countries), food safety (37% of countries), food production (18% of countries) and the environment (9% of countries).

About 18% of countries not only have launched nationwide, government-supported campaigns on AMR awareness targeting all or the majority of relevant stakeholders within the animal health sector (Level D), but also already implemented strategies to change behaviour regarding AMR in target groups in animal health sectors (Level E).



Figure 14: Regional progress on awareness and understanding of AMR in non-human sectors (2016–2017, 2017–2018)



2016–2017

- A = No significant awareness-raising activities on risks of antibiotic resistance for animal health and risks of transmission of resistant pathogens through the food chain
- B = Some activities in parts of the country to raise awareness about antimicrobial resistance and actions to address it.
- C = Nationwide, antimicrobial awareness campaign targeting food producers and farmers, with government involvement.
- D = Nationwide, government-supported antimicrobial awareness campaign targeting specific groups (e.g. veterinarians, veterinary para-professionals, farmers, pharmaceutical agents,).
- E = Focused, national-scale activities to change behaviour in target groups in animal health, animal husbandry and in the food chain, in both public and private sectors. Monitoring of awareness and behaviour change in last 5 years.

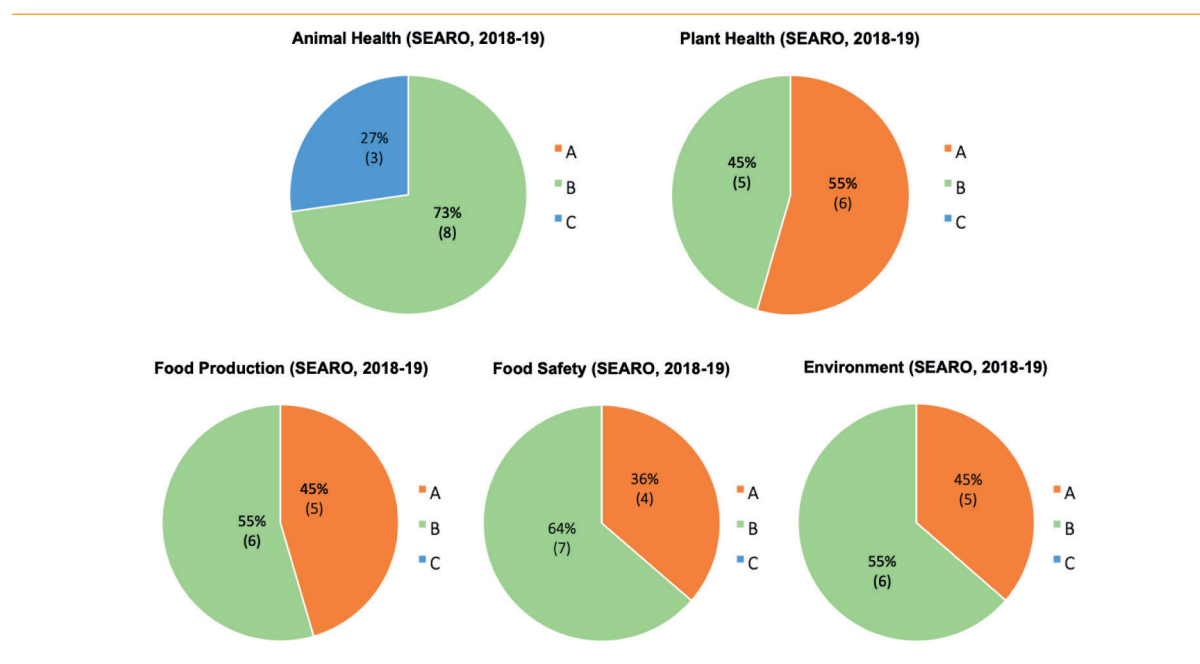
2017–2018

- A = No significant awareness-raising activities on relevant aspects of risks of antimicrobial resistance.
- B = Some activities in parts of the country to raise awareness about risks of antimicrobial resistance and actions that can be taken to address it.
- C = Limited or small-scale antimicrobial resistance awareness campaign targeting some but not all relevant stakeholders within sector.
- D = Nationwide, government-supported antimicrobial resistance awareness campaign targeting all or most relevant stakeholders within sector.
- E = Focused, national scale government supported activities implemented to change behavior of relevant stakeholders within sector, with monitoring undertaken of their awareness and behaviour change over the last two to five years.



Furthermore, regional commitment also contributes to the significant progress on awareness and understanding of AMR in non-human sectors (i.e. animal health, plant health, food production, food safety and the environment). In most countries, some activities related to those sectors are already completed (Level B), with 27% of SEA Region countries make the animal health sector a main focus for activities (Level C) on raising awareness and understanding of AMR risks and responses.

Figure 15: Regional progress on the extent of involvement of non-human sectors (2018–2019)



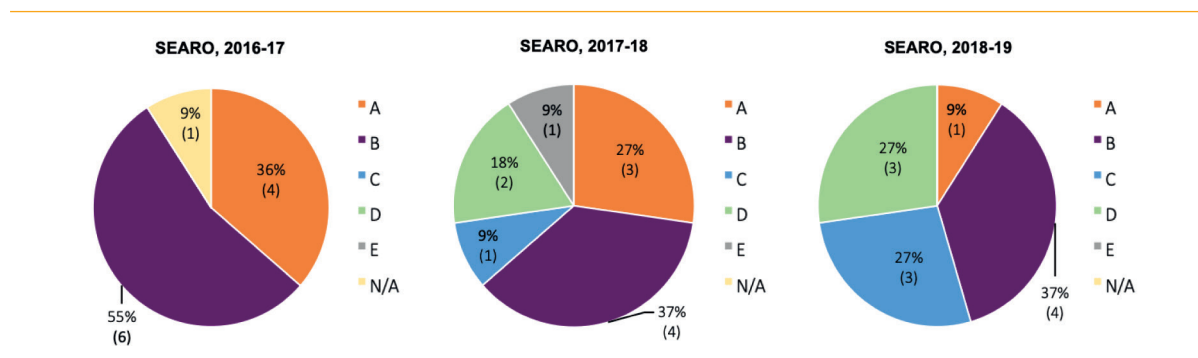
A = This sector not involved
 B = Some activities done in this sector
 C = This sector is a main focus of activities

Globally, training on AMR in the veterinary sector is less commonly seen, particularly among countries not part of the G20. Around 30.5% of countries have no AMR training for veterinary professionals and yet only a single G20 country reported no training. Slightly more than 40% of G20 countries are at Level D–E on AMR training for veterinary professionals, compared with only 9.7% of non-G20 countries [1]

Regionally, progress has been made on training and professional education on AMR in the veterinary sector: Ad hoc AMR training courses are available (Level B) for veterinary related professionals in most SEA Region countries. AMR and its appropriate use is covered in core curriculums for graduating veterinarians and veterinary paraprofessionals (Level C), with the increase being from 9% of countries (2017–2018) to 27% (2018–2019). The number of countries with continuing professional training on antimicrobial resistance and antimicrobial use available nationwide for veterinary professionals (Level D) also increased from 18% (2017–2018) to 27% (2018–2019).



Figure 16: Regional progress of AMR training and professional education in the veterinary sector (2016–2017, 2017–2018, 2018–2019)



2016–2017

A = No training of veterinary workforce on AMR.

B = Ad hoc training courses on AMR available.

C = Regular participation in training opportunities on AMR.

D = Training opportunities are available nationwide for public and private sector veterinarians, veterinary paraprofessionals and animal health workforce on mechanisms leading to AMR, regulations and best practices for antimicrobial use.

E = AMR incorporated in core veterinary education and CPD for veterinarians, veterinary para-professionals and others involved in animal health and agriculture.

2017–2018, 2018–2019

A = No training of veterinary related professionals (veterinarians and veterinary paraprofessionals) related to AMR.

B = Ad hoc AMR training courses available for veterinary related professionals.

C = AMR and appropriate use is covered in core curricula for graduating veterinarians and for veterinary paraprofessionals when relevant.

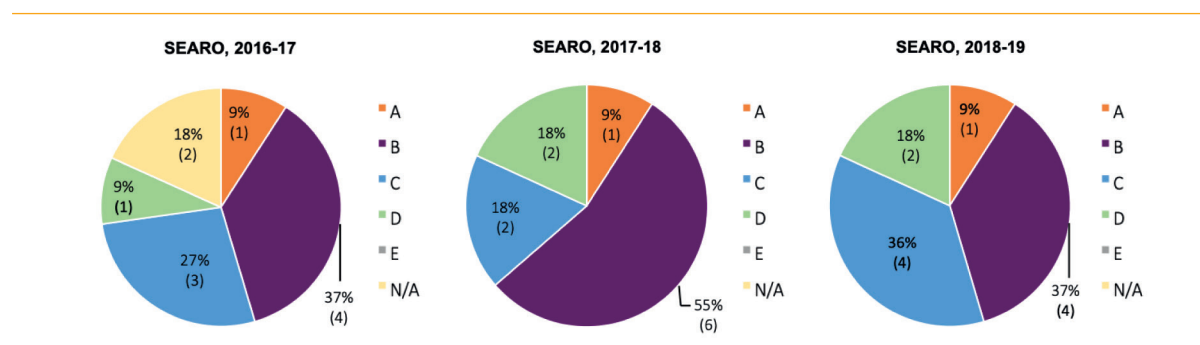
D = Continuing professional training on antimicrobial resistance and antimicrobial use is available nationwide for veterinary related professionals.

E = AMR is systematically and formally incorporated in curricula for graduating veterinarians and veterinary paraprofessionals when relevant and continuing professional training is a formal requirement.

Globally, activity in strengthening of the veterinary sector is limited in all regions. Less than 20% of the countries in all regions, except the WHO European Region, have progressed past the point of implementing a plan to strengthen capacity gaps in veterinary services responding to AMR [1]. Progress with strengthening veterinary services has been achieved at a regional level. Most SEA Region countries have implemented plans to strengthen capacity gaps in veterinary services (Level C): 9% (2016–2017) to 18% (2017–2018 and 2018–2019) of them have been monitoring the performance of veterinary services on a regular basis (Level D).



Figure 17: Regional progress with strengthening veterinary services (2016–2017, 2017–2018, 2018–2019)



A = No systematic approach at the national level to strengthening veterinary services.

B = Veterinary services assessed and plans developed to improve capacity, through a structured approach such as OIE Performance of Veterinary Services (PVS) Evaluation and PVS Gap Analysis missions.

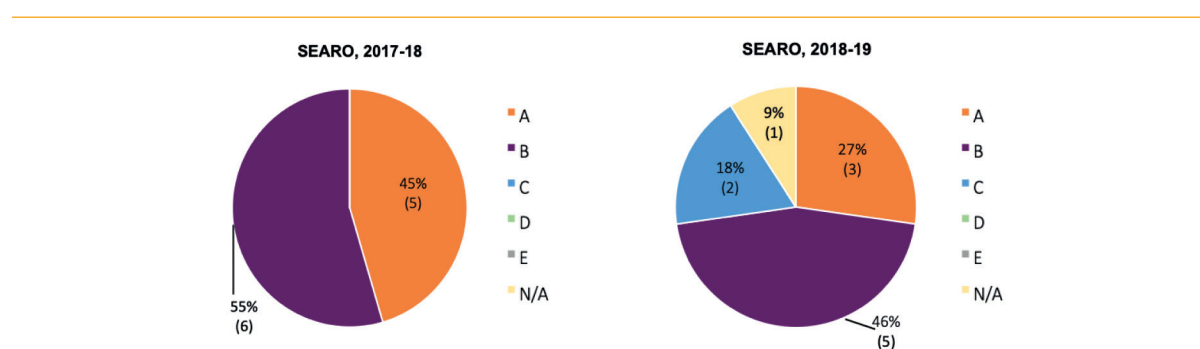
C = Implementation of plan to strengthen capacity gaps in Veterinary Services underway.

D = Monitoring of Veterinary Services performance carried out regularly, e.g. through PVS evaluation follow-up missions.

E = Documented evidence of strong capacity in compliance with OIE standards on the quality of veterinary services³.

Globally, training on AMR in the plant health, food production, food safety and environment sectors was also low; around 43.5% of countries have had no training on AMR for key stakeholders (Level A) and only 16.9% countries have achieved Level C or higher [1]. Progress in training and professional education on AMR in the farming sector (animal and plant), food production, food safety and the environment has been made in the SEA Region. Tailored ad hoc AMR training courses are available for at least two groups of key stakeholders (Level B) in most countries. Besides, tailored ad hoc AMR training courses are available for all or the majority of key stakeholders (Level C) in 18% of SEA Region countries.

Figure 18: Regional progress of AMR training and professional education in the farming sector (animal and plant), food production, food safety and the environment sectors (2017–2018, 2018–2019)



A = No training provision on AMR for key stakeholders, e.g. farmers and farm workers, extension workers, food and feed processors and retailers, environmental specialists.

B = Tailored ad hoc AMR training courses available for at least two groups of key stakeholders.

C = Tailored ad hoc AMR training courses are available for all or the majority of key stakeholders.

3 http://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_vet_serv.htm

D = Tailored AMR training courses are routinely available nationwide for all key stakeholders and completion of training is a formal requirement for at least two groups of key stakeholders.

E = Tailored AMR training courses are routinely available nationwide and completion of training is a formal requirement for all key stakeholders.

5.2 Country progress

Awareness-raising has been an area of implementation which has been initiated by many countries [1]. In general, country progress on raising awareness and understanding of AMR risks and responses has been achieved. In 2018–2019, all SEA Region countries have had antimicrobial resistance awareness campaigns targeting some but not all relevant stakeholders (Level C) [Appendix 2]. Six out of 11 countries of the SEA Region have launched the nationwide and government-supported antimicrobial resistance awareness campaigns targeting all or the majority of relevant stakeholders (Level D). In one of the 11 countries of the SEA Region, nationwide government-supported activities have been implemented to change the behaviour of key stakeholders, with monitoring undertaken over the last 2–5 years (Level E) [Table 8–10, 12–14]

Human sector

Globally, most countries have made at least some progress towards raising awareness on AMR and human health. Across regions, between 40%–55% of countries have limited or small-scale AMR awareness campaigns targeting some (but not all) relevant stakeholders (Level C) [1]. The countries of the SEA Region have progressed on raising awareness and understanding of AMR risks and responses in human health. Since 2017–2018, all countries have achieved Level C or higher level in this regard [Appendix 2].

Five of the 11 countries of the SEA Region have launched nationwide government-supported campaigns on AMR awareness in human health (Level D). In one of the 11 countries of the SEA Region, national-scale government-supported activities have been implemented to change behaviours related to antibiotic resistance in target groups in human health, both from the public and private sectors, with monitoring of their awareness and behaviour change over last five years undertaken [Table 8–9, 12–14].

Among countries with a developed national action plan (Level C–E), the odds of having a nationwide (Level D–E) awareness campaign in the human sector are 4.9 times higher. Income also appears to have a significant impact on progress in awareness; a much greater proportion of G20 countries are at Level D–E than non-G20 countries [1]. Over and above regional commitment, country commitment greatly contributes to significant progress on awareness and understanding of AMR in human health. Almost all countries in the SEA Region make the human health sector the main focus for activities (Level C) on raising awareness and understanding of AMR risks and responses [Appendix 2].

Most countries have some level of training on AMR available in the human health sector. Globally, 22.7% have only ad hoc training available (Level B) though [1]. However, country progress in training and professional education on AMR in the human health sector has been made [Appendix 2]. Since 2018–2019, all SEA Region countries not only have had training for human health workers on AMR, but six of the 11 Member countries have also been covered by AMR in some pre-service and in-service training or other continuing professional development for human health workers (Level C)



[Table 4,7,9–12]. At the same time, country progress in two countries decreased from Level D-C to Level B. This requires attention along with developing country progress improvement strategies in several countries that are still stagnating at Level B.

Non-human sector

Globally, training on AMR in the plant health, food production, food safety and environment sectors was also low. There is no significant relationship between the size of the chicken, pork or cattle industries and AMR training in the non-health sectors. Generally, G20 and high-income countries have witnessed more progress than non-G20 and low-income countries [1]. However, in countries of the SEA Region progress has been made on raising awareness and understanding of AMR risks and responses in the non-human health sectors, especially for animal health and food production. In 2017–2018, five of the 11 countries of the Region had held at least some activities to raise awareness about the risks of antimicrobial resistance and related actions were taken (Level B) to address AMR not only in the sector of animal health, food production and food safety but also in plant health and the environment sector.

Two of those five countries have also launched nationwide government-supported campaigns on AMR awareness targeting all or most relevant stakeholders within the animal health sector (Level D). One of the 11 countries of the SEA Region has also implemented strategies to change behaviour regarding AMR in the target groups in animal health sectors (Level E) [Appendix 2].

On the other hand, country commitment also contributes to the significant progress on awareness and understanding of AMR in non-human sectors (i.e. animal health, plant health, food production, food safety and environment). In most countries, some activities related to those sectors are already implemented (Level B) [Appendix 2]. Around three of the 11 countries of the SEA Region make the animal health sector a focus for activities (Level C) on raising awareness and understanding of AMR risks and responses [Table 4,10,12]. The sectors that are least involved in most of the countries of the SEA Region (i.e. plant health, food production, environment) bear the potential for improvement.

Globally, training on AMR in the veterinary sector is less common. A little more than 40% of G20 countries are at Level D-E on AMR training for veterinary professionals, compared with only 9.7% of non-G20 countries [1]. In one of the G20 countries, not only are ad hoc AMR training courses available (Level B) but also continuing professional training on antimicrobial resistance and antimicrobial use has been made available nationwide for veterinary-related professionals (Level D) since 2017–2018 [Table 7].

On the other hand, country progress on training and professional education on AMR in the veterinary sector has also been made in other countries of the SEA Region [Appendix 2]. In at least six of the 11 countries, AMR and appropriate use is covered in the core curriculums for graduating veterinarians and for veterinary paraprofessionals when relevant (Level C). In three of those countries, there already is continuing professional training on antimicrobial resistance and antimicrobial use nationwide (Level D) for veterinary-related professionals. In one SEA Region Member State (2017–2018), AMR is systematically and formally incorporated into the curriculum for graduating veterinarians and veterinary paraprofessionals where relevant, and continuing professional training is a formal requirement (Level E) [Table 5,7,10–13].



Globally, less than 20% of countries in all regions (except the European Region) have progressed past the point of implementing a plan to strengthen capacity gaps in veterinary services responding to AMR [1]. Country progress with strengthening veterinary services also has been made in the SEA Region. Since 2016–2017, veterinary services are assessed, and plans developed in eight of 11 countries of the SEA Region to improve capacity (Level B). Six of them have implemented plans to strengthen capacity gaps in veterinary services (Level C). Even two of the 11 countries of the SEA Region have monitoring of veterinary services performance carried out regularly (Level D) [Appendix 2].

Globally, training on AMR in the plant health, food production, food safety and environment sectors was also low; with around 43.5% of the countries having had no training on AMR for key stakeholders (Level A) and only 16.9% countries having achieved Level C or higher [1]. Despite that, country progress in training and professional education on AMR in the farming sector (animal and plant), food production, food safety and the environment has been made in the SEA Region [Appendix 2]. Tailored ad hoc AMR training courses are available for at least two groups of key stakeholders (Level B) in nine of the 11 countries. Since 2018–2019 tailored ad hoc AMR training courses are available in two of the 11 countries of the SEA Region for all or most of the key stakeholders (Level C) [Table 6–13].



Strengthening the knowledge and evidence base through surveillance and research

Sub-indicators related to the national surveillance systems are also included in the national laboratory network strengthening and early warning systems [4]. Globally, for GAP objective 2, countries with large multisectoral working groups have more than twice the chance of having a national monitoring system for antimicrobial consumption in the human health sector, although no such relationships exist for monitoring of antimicrobial use in other sectors.

There is also a clear gradient among income groups on monitoring antimicrobial consumption. On the other hand, it is important to note that the mid-point (Level C) on the human and non-human scales differ. For AMR surveillance in the human sector, Level C indicates that countries have national AMR surveillance activities in place of common bacterial pathogens that link patient information with susceptibility testing, with a national reference laboratory that participates in external quality assurance. For AMR surveillance in the non-human sector, Level C indicates that some AMR data is collected locally but may not be collected using standardized approaches, and that lacks national coordination and/or quality management [1].

In the SEA Region, most country progress on national monitoring systems for antimicrobial use and national surveillance systems for AMR in human health and animal health are at levels B and C, while the plant and environment sector still does not register significant progress. Around 36% of the countries of the SEA Region accommodate three or four aspects of national AMR laboratory networks comprehensively (i.e. laboratory integration, standardization and harmonization of procedures, relevance of diagnostic techniques, and data management) at Level C or higher. However, most countries do not have a multisectoral working group or coordination committee in charge of their national AMR strategy to review data on antimicrobial consumption and resistance, both in human health and animal health sectors.

6.1 Regional progress

Human sector

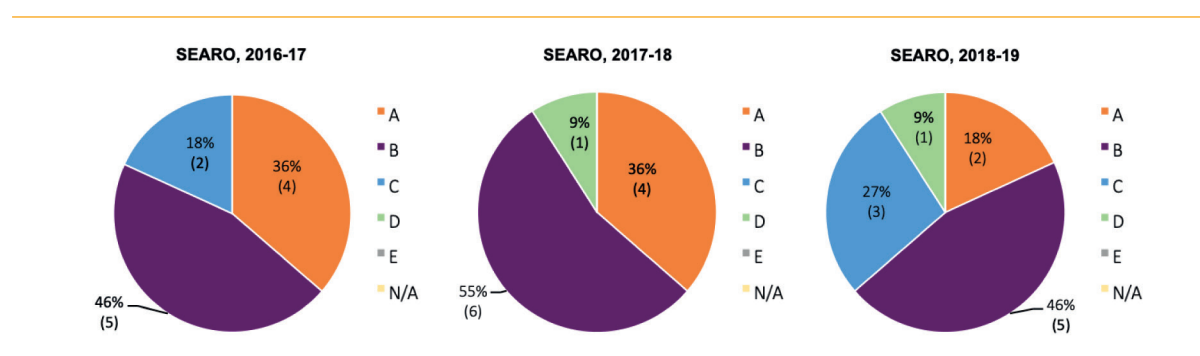
In terms of monitoring of antimicrobial consumption, we estimate that 3.5 billion people, or 46.4% of the global population, live in countries that have monitoring mechanisms in place for human antimicrobial consumption, where the total sales of antimicrobials are monitored at the national level and/or monitoring of antibiotic use at the subnational level (Level C or higher). Overall, these



monitoring systems are key to enabling the study of AMR interventions and to detect trends in the consumption of antimicrobials. Until now, 29.2% of countries do not have any systems in place for monitoring antimicrobial use in humans [1].

Regionally, among the countries of the SEA Region, progress has been made on national monitoring systems for consumption and rational use of antimicrobials in human health. In 18% of countries of the SEA Region (2016–2017), total sales of antimicrobials are monitored at the national level and/or there is some monitoring of antibiotic use at the subnational level (Level C). This increased to 27% in 2018–2019. Since 2017–2018, even prescribing practices and appropriate antibiotic use have also been monitored in national samples from health-care settings in 9% of the countries of the SEA Region.

Figure 19: Regional progress on national monitoring for antimicrobial use in human sector (2016–2017, 2017–2018, 2018–2019)



A = No national plan or system for monitoring use of antimicrobials.

B = System designed for surveillance of antimicrobial use, that includes monitoring national level sales or consumption of antibiotics in health services.

C = Total sales of antimicrobials are monitored at national level and/or some monitoring of antibiotic use at sub-national level.

D = Prescribing practices and appropriate antibiotic use are monitored in a national sample of healthcare settings.

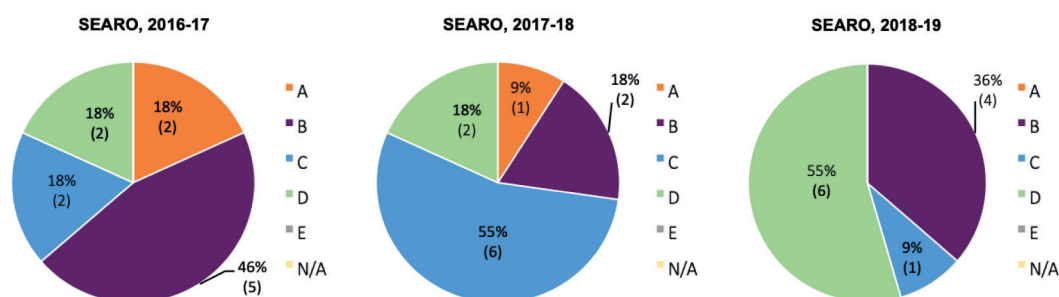
E = On a regular basis (every year/two years) data is collected and reported on:

- Antimicrobial sales or consumption at national level for human use; and
- Antibiotic prescribing and appropriate/rational use, in a representative sample of health facilities, public and private

Globally, most countries have established an AMR surveillance system for common bacterial pathogens in humans and more than two-thirds of countries have achieved Level C or higher [1]. Regionally, since 2018–2019, AMR data is collated locally in all countries of the SEA Region, at least for common bacteria. Nonetheless, data collection may not use a standardized approach and lacks national coordination and/or quality management (Level B).

Among them, national AMR surveillance activities for common bacterial infections follow national standards, and a national reference laboratory that participates in external quality assurance (Level C) has also been carried out by more than 55% of countries. Moreover, there is a functioning national AMR surveillance system covering common bacterial infections in hospitalized and community patients, with external quality assurance. A national coordinating centre produced reports on AMR (Level D) in 18% of countries and this increased to 55% in 2018–2019.

Figure 20: Regional progress on national surveillance system for AMR in the human sector (2016–2017, 2017–2018, 2018–2019)



2016–2017, 2017–2018

- A = No capacity for generating data (antibiotic susceptibility testing and accompanying clinical and epidemiological data) and reporting on antibiotic resistance.
- B = AMR data is collated locally for common bacteria, but data collection may not use a standardized approach and lacks national coordination and/or quality management.
- C = National AMR surveillance activities are in place for common bacterial pathogens that link patient information with susceptibility testing, with a national reference laboratory that participates in external quality assurance.
- D = There is a functioning national AMR surveillance system covering antibiotics in hospitals and outpatient clinics, with external quality assurance, and a national coordinating centre producing reports on resistance levels.
- E = The national AMR surveillance system integrates surveillance of AMR across sectors, and generates regular reports. The national surveillance system contributes data on AMR to the Global AMR Surveillance System (GLASS).

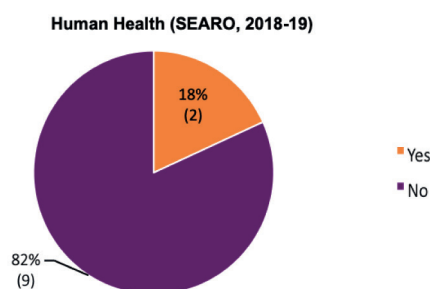
2018–2019

- A = No capacity for generating data (antibiotic susceptibility testing and accompanying clinical and epidemiological data) and reporting on antibiotic resistance.
- B = AMR data is collated locally for common bacteria, but data collection may not use a standardized approach and lacks national coordination and/or quality management.
- C = National AMR surveillance activities for common bacterial infections follow national standards, and a national reference laboratory that participates in external quality assurance.
- D = There is a functioning national AMR surveillance system covering common bacterial infections in hospitalized and community patients, with external quality assurance, and a national coordinating centre producing reports on AMR.
- E = The national AMR surveillance system integrates surveillance of AMR across sectors, and generates regular reports covering at least one common indicator.

Globally, for human health, although many countries report that they have national systems for monitoring resistance patterns and consumption and use, a smaller proportion is enrolled in GLASS, or is reporting data to WHO. Substantially more countries are reporting data on consumption in the animal sector to OIE [1]. Regionally, progress on national AMR strategy data reviews in countries of the SEA Region have not been made. Around nine of the 11 countries of the SEA Region still do not have a multisectoral working group or coordination committee in charge of the national AMR strategy reviews data [Appendix 2]. Only two of 11 countries of the SEA Region have multisectoral working groups or coordination committees in charge of national AMR strategy reviews data on antimicrobial consumption and resistance in human health sector annually, and that considers their implications and amends national strategy accordingly [Table 12–13].



Figure 21: Regional progress on national AMR strategy data reviews in human sector (2018–2019)



Non-human sector

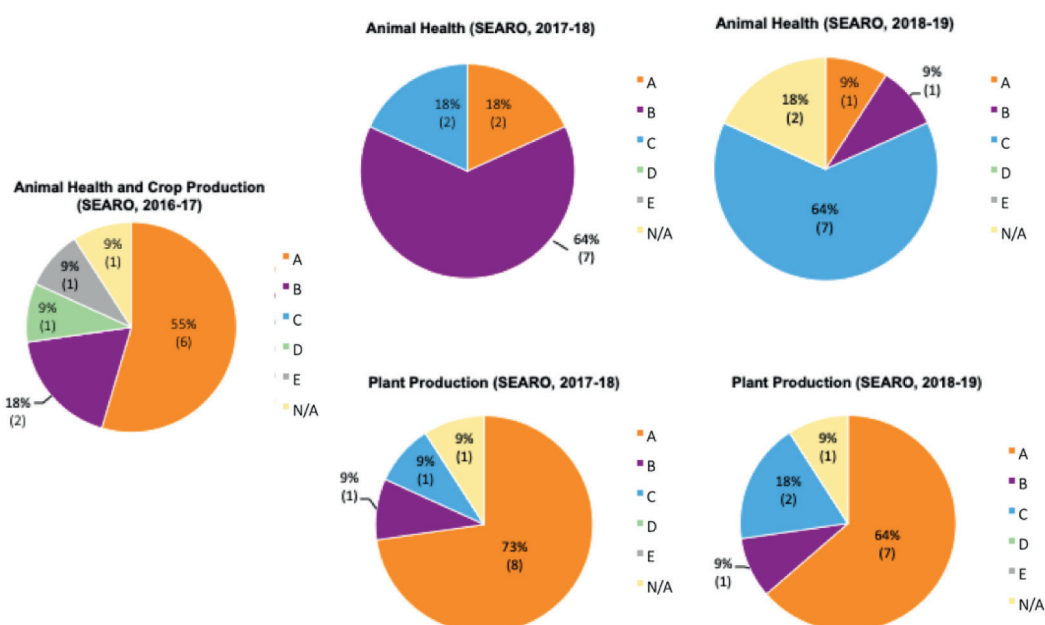
Globally, a similar gradient exists for monitoring the consumption of antimicrobials in the animal health sector; 68% of high-income countries, 34.1% of upper-middle-income countries, 25% of lower-middle-income countries, and 15.8% of low-income countries report having achieved Level C or better. Systems for monitoring the use of antimicrobials in the plant sector exist only in 22% of high-income countries and 6.8% of upper-middle-income countries [1]

Regionally, progress among countries of the SEA Region on national monitoring systems for antimicrobials intended to be used in non-human sectors (i.e. animals (sales and use), and for pesticide use in plant production) has been made. Plans of most countries agreed to monitor quantities of antimicrobials sold for/used in animals, based on OIE standards (Level B). Around 18% of countries of the SEA Region in 2017–2018 carried out data collection and reported on the total quantity of antimicrobials sold for or used in animals and their intended types of use (therapeutic or growth promotion), which was at Level C, and this increased to 64% of countries of the SEA Region in 2018–2019.

Regarding plant production, data collected and reported on the total quantity of pesticides sold/used nationally for controlling bacteria or fungal diseases (Level C) recorded 9% of countries of the SEA Region (2017–2018) that increased to 18% in 2018–2019. However, there are many countries that do not have a national plan or system for monitoring the use of pesticides used for controlling bacteria or fungal diseases in plants.



Figure 22: Regional progress on national monitoring for antimicrobial use in non-human sector (2016–2017, 2017–2018, 2018–2019)



Animal health sector

- A = No national plan or system for monitoring sales/use of antimicrobials in animals.
- B = Plan agreed for monitoring quantities of antimicrobials sold for/ used in animals, based on OIE standards.
- C = Data collected and reported on total quantity of antimicrobials sold for/used in animals and their intended type of use (therapeutic or growth promotion).
- D = On a regular basis, data is collected and reported to the OIE on the total quantity of antimicrobials sold for/used in animals nationally, by antimicrobial class, by species (aquatic or terrestrial), method of administration, & by type of use (therapeutic/growth promotion).
- E = Data on antimicrobials used under veterinary supervision in animals are available at farm level, for individual animal species.

Animal health and crop production

- A = No national plan or system for monitoring use of antimicrobials in animal or crop production.
- B = Plan agreed for monitoring quantities of antimicrobials used in animals, based on OIE standards.
- C = Implementation of plans to monitor sales, consumption and type of use (therapeutic or growth promotion).
- D = Data collected and reported on national sales or consumption of antimicrobials for animal production.
- E = On a regular basis, data is collected and reported

Plant Production Sector

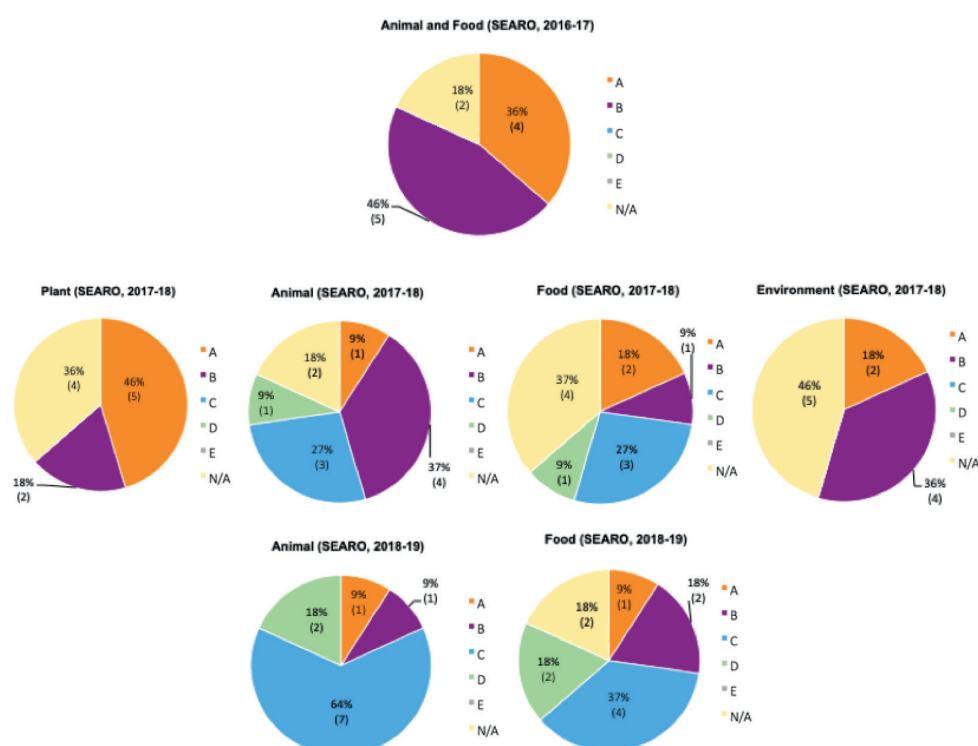
- A = No national plan or system for monitoring use of pesticides used for controlling bacteria or fungal diseases⁶.
- B = Plan agreed for monitoring quantities of pesticides used for the purpose of controlling bacteria or fungal diseases. (C to E on 2017–2018)
- C = Data collected and reported on quantity of AM used in some subsectors of plant production.
- D = Data collected and reported on total quantity of AM used nationally in plant production.
- E = On a regular basis, data is collected and reported on total quantity of AM use in crop production, by AM class. (C to D on 2018–2019)
- C = Data collected and reported on total quantity of pesticides sold/ used nationally for controlling bacteria or fungal diseases.
- D = On a regular basis, data is collected and reported on quantity of pesticides sold/used in plant production for controlling bacteria or fungal diseases, disaggregated by class of active ingredient

Globally, on the non-human side, the animal sector is the furthest: 43.5% countries are at Level C or higher. This is followed by the food sector with 38.9% countries at Level C or higher. In the environment and plant sectors, most countries have no systems in place for surveillance and many countries were unable to provide responses to the question [1]. Regionally, the national surveillance system for antimicrobial resistance in non-human sectors (i.e. animals (terrestrial and aquatic), food (animal and plant origin), plant and environment) has been set up.

Most countries of the SEA Region have a national plan for AMR monitoring (at least Level B) but capacity (including laboratories) for surveillance and reporting data on AMR is lacking, especially in the plant and environment sectors. In 27% of countries (2017–2018), some AMR data related to animals (terrestrial and aquatic) have been collected locally, and this increased to 64% of countries in 2018–2019. But these countries may not use a standardized approach and lack national coordination and/or quality management (Level C). On the other hand, progress in the food sector for Level C has increased from 27% of countries in 2017–2018 to 37% in 2018–2019.

Priority pathogenic/commensal bacterial (in animal) or priority food borne pathogenic/indicator bacterial species (in food) have already been identified for surveillance. The data are systematically collected and reported on levels of resistance (Level D) in 9% of countries of the SEA Region in 2017–2018 and 18% in 2018–2019 respectively, where a laboratory that follows quality management processes (e.g. proficiency testing) was involved.

Figure 23: Regional progress on national surveillance system for AMR in non-human sector (2016–2017, 2017–2018, 2018–2019)



2016–2017

A = No national plan or system for monitoring AMR in animals, food and agricultural production.

B = AMR data is collected locally but may not use a standardized approach and lacks national coordination and/or quality assurance. Priority pathogens have been identified for surveillance.



- C = Studies available on levels of resistance in at least 2 pathogens relevant for animals.
- D = National system of surveillance of AMR established for relevant animal pathogens which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.
- E = Data collected and reported on a regular basis on AMR in relevant pathogens for animals and in food.

2017–2018

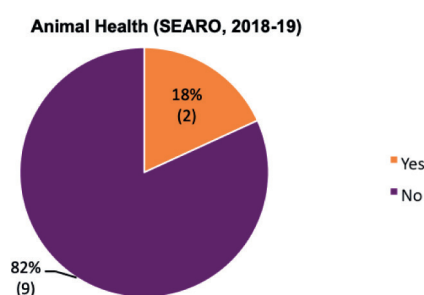
- A = No national plan for a system of monitoring of AMR is available.
- B = National plan for monitoring AMR but capacity (including laboratory) for surveillance and reporting data on AMR is lacking.
- C = Some AMR data is collected locally but may not use a standardized approach and lacks national coordination and/or quality management.
- D = Priority pathogenic/ commensal bacterial species have been identified for surveillance. Data systematically collected and reported on levels of resistance in at least 2 of those bacterial species, involving a laboratory that follows quality management processes, e.g. proficiency testing.
- E = National system of surveillance of AMR established for priority pathogens and for relevant commensal bacteria which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.

2018–2019

- A = No national plan for a system of surveillance of AMR is available.
- B = National plan for surveillance of AMR but capacity (including laboratory and for reporting data on AMR) is lacking.
- C = Some AMR data is collected locally but may not use a standardized approach and lacks national coordination and/or quality management.
- D = Priority pathogenic/ commensal bacterial (in animal) or priority food borne pathogenic/ indicator bacterial species (in food), which have been identified for surveillance. Data systematically collected and reported on levels of resistance in at least 1 of those bacterial species, involving a laboratory that follows quality management processes, e.g. proficiency testing.
- E = National system of surveillance of AMR established for priority animal pathogens, zoonotic and commensal bacterial isolates (in animal), priority foodborne pathogens (in food), and/or relevant indicator bacteria which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.

Regionally, progress on national AMR strategy data reviews for the animal health sector in countries of the SEA Region have not been made. Around 82% of countries of the SEA Region still don't have a multisectoral working group or coordination committee in charge of national AMR strategy reviews data [Appendix 2]. Only two of 11 countries of the SEA Region have a multisectoral working group or coordination committee in charge of national AMR strategy reviews data on antimicrobial consumption and resistance in animal health sector at least annually, and that considers implications and amends national strategy accordingly [Table 4,13].

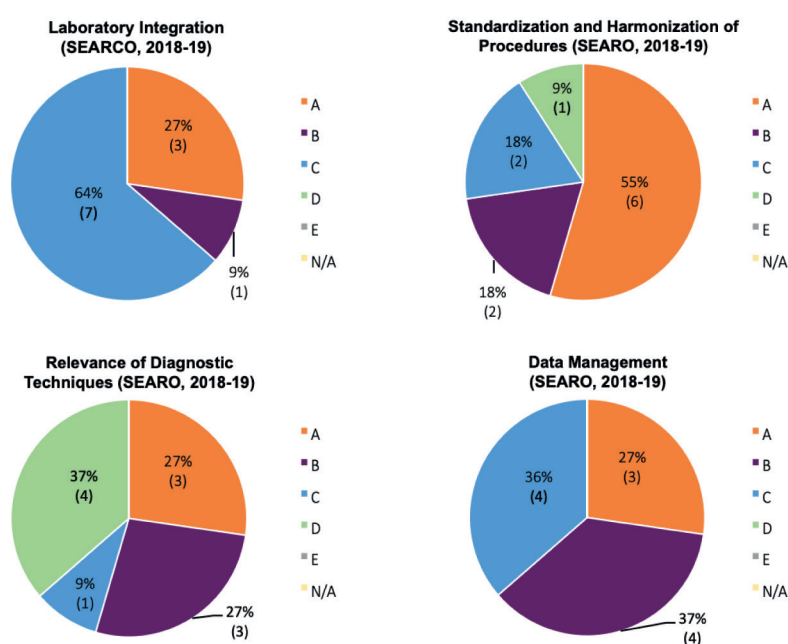
Figure 24: Regional progress on national AMR strategy data reviews in the non-human sector (2018–2019)



The national AMR laboratory network includes not only the animal health and food safety sectors, but also laboratories that process samples from food-producing terrestrial and aquatic animals and from food. The countries of the SEA Region which also have a national programme for AMR surveillance in plant health and/or the environment should include these laboratories too. Related to the effective integration of laboratories into AMR surveillance, 64% of countries have some AST performing laboratories that are integrated in the national AMR surveillance system (Level C). However, progress on the level of standardization and harmonization of procedures among laboratories included in the AMR surveillance system is not significant. Only 18% of the countries that have many laboratories follow the same AST guidelines (Level C or higher).

Related to the relevance of diagnostic techniques used by laboratories included in the AMR surveillance system, 37% of countries have minor modifications in the AST, and bacterial isolation and identification protocols used would improve their adaptation to the national AMR surveillance objectives (Level D). Related to the technical level of data management of laboratory networks in AMR surveillance systems, most laboratories of the network in 36% countries use computers to manage their data, but major improvements in the system are required (Level C).

Figure 25: Regional progress on national AMR laboratory network in the AMR surveillance system (2018–2019)



Laboratory Integration

A = Information not available.

B = Laboratories perform antimicrobial susceptibility testing (AST) for own purposes and are not included in the national AMR surveillance system.

C = Some laboratories performing AST are integrated in the national AMR surveillance system.

D = All laboratories performing AST are integrated in the AMR surveillance system but the role should be better formalized and the network better and developed.

E = All laboratories performing AST are integrated in the national AMR surveillance system, have a clear position, and are linked to a national network coordinated by a National Reference Laboratory.

Standardization and harmonization of procedures

A = Information not available.

B = No standardized national AST guidelines are in place or less than 30% laboratories follow the same AST guidelines.

C = Between 30% to 79% of laboratories follow the same AST guidelines.

D = Over 80% of laboratories use the same AST guidelines.

E = 100% of laboratories use the same AST guidelines.

Relevance of diagnostic techniques

A = Information not available.

B = AST, bacterial isolation and identification protocols are not relevant or specific to the national AMR surveillance objectives.

C = Major modifications in the AST, bacterial isolation and identification protocols used are required to improve their adaptation to national AMR surveillance objectives.

D = Minor modifications in the AST, bacterial isolation and identification protocols used would improve their adaptation to the national AMR surveillance objectives.

E = AST, bacterial isolation and identification protocols are perfectly suited to the national AMR surveillance objectives.

Data management

A = Information not available.

B = AST data are handled manually, or AST data management is not computerized in all laboratories of the network and/or there are problems in the recording of the samples and their traceability along the analysis chain.

C = Most laboratories of the network use computers to manage part of their data but major improvements in the system are required.

D = Some minor improvements may be made in some laboratories of the network for the computerized management of laboratory data (computerized transmission of data, input procedures, sample storage information, etc.).

E = All laboratories use optimal data management (e.g. samples and test results are identified using a complete computerized management system covering each step in the analysis chain, including the storage of epidemiological information, data validation protocol and the computerized transmission of results, conforming perfectly to the requirements of the national AMR surveillance system).

6.2 Country progress

Human sector

Monitoring systems for antimicrobial consumption are key to enabling the study of AMR interventions and detecting overall trends in the consumption of antimicrobials [1]. Country progress on national monitoring systems for consumption and rational use of antimicrobials in human health has been made [Appendix 2]. A system for surveillance of antimicrobial use, which includes monitoring national-level sales or consumption of antibiotics in health services (Level B), has been designed in nine of the 11 countries of the Region. Five of these countries have monitored total sales of antimicrobials at the national level and/or performed some monitoring of antibiotic use at subnational levels (Level C). Prescribing practices and appropriate antibiotic use also are monitored in a national sample of health-care settings (Level D) in one of 11 countries of the Region [Table 4–9,12–14].

Tangible progress on national surveillance systems for antimicrobial resistance in human health has been made. Since 2018–2019, AMR data is collated locally in all countries of the SEA Region, at least for common bacteria, but data collection may not use a standardized approach and may lack national coordination and/or quality management (Level B) [Appendix 2].



Eight countries of the SEA Region already have a surveillance system that follows national standards and national reference laboratories that participate in external quality assurance (Level C). Around six of the 11 countries of the SEA Region also have national AMR surveillance systems covering common bacterial infections in hospitalized and community patients, with external quality assurance, and a national coordinating centre producing reports on AMR (Level D) [Table 4–5,7,9–13].

Non-human sector

Country progress on national monitoring systems for antimicrobials intended to be used in non-human sectors (i.e. animals (sales/use), and for pesticide use in plant production) has also been made. Nine countries of the SEA Region agreed to monitor quantities of antimicrobials sold for or used in animals, based on OIE standards (Level B). In 2017–2018, data collected and reported on the total quantity of antimicrobials sold for or used in animals and their intended types of use (therapeutic or growth promotion) showed Level C in two countries; this increased to seven of 11 countries in 2018–2019 [Appendix 2].

Related to the plant production, data were collected and reported on the total quantity of pesticides sold or used nationally to control bacteria or fungal diseases (Level C) in two of 11 countries of the SEA Region [Table 10,13]. Although there are still many countries that do not have a national plan or system for monitoring the use of pesticides for controlling bacteria or fungal diseases, this progress can be improved to Level B or C.

Country progress on national surveillance systems for AMR in non-human sectors (i.e. animals (terrestrial and aquatic), food (animal and plant origin), plant and environment) has been made. Ten countries of the SEA Region have national plans for AMR monitoring (at least Level B) but capacity (including laboratories) for surveillance and reporting data on AMR is still lacking, especially in the plant and environment sector.

In 2018–2019, some AMR data related to animals (terrestrial and aquatic) were collected locally in nine of the 11 countries but have not been used in a standardized fashion. There is also lack of national coordination and/or quality management (Level C). On the other hand, progress in Level C for the food sector was also recorded in six of 11 countries of the SEA Region. Among them, two countries identified priority pathogenic/commensal bacterial (in animal) or priority foodborne pathogenic/indicator bacterial species (in food) for surveillance, and systematically collected and reported data on levels of resistance (Level D) involving a laboratory that follows quality management processes (e.g. proficiency testing) [Appendix 2].

In four non-human sectors (i.e. plant, environment, animal and food sectors) in 2017–2018, there is no data that explained the level of national surveillance system for AMR. However, the level of progress in one of the countries of the SEA Region was at Level B while in another country it was at Level C [Table 4,11]. Besides, two of the 11 countries of the Region have national surveillance systems for antimicrobial resistance in animals (terrestrial and aquatic) placed at level D [Table 4,8]. AMR surveillance in one of the countries of the Region is routinely undertaken in animals for ESBL producing indicator *E. coli* obtained from healthy animals in key food producing species [Table 4], while AMR surveillance in another country is routinely undertaken in animals for commensal isolates [Table 8].



Moreover, two of 11 countries of the SEA Region have national surveillance systems for antimicrobial resistance in food (animal and plant origin) placed at level D [Table 8, 12]. AMR surveillance in one country of the SEA Region is systematically undertaken in food for foodborne pathogenic bacteria (animal origin) and indicator bacteria (animal origin) [Table 8], while AMR surveillance in another country is systematically undertaken in food for foodborne pathogenic bacteria (animal origin) [Table 12].

The National AMR Laboratory Network includes not only the animal health and food safety sectors, but also laboratories that process samples from food-producing terrestrial and aquatic animals and from food. Countries of the SEA Region which also have a national programme for AMR surveillance in plant health and/or the environment should include these laboratories, too. Related to the effective integration of laboratories in AMR surveillance, seven of the 11 countries have some AST-performing laboratories that are integrated into the national AMR surveillance system (Level C). However, progress on the level of standardization and harmonization of procedures among laboratories included in the AMR surveillance system is not significant. Only three of 11 countries that have many laboratories are following the same AST guidelines (Level C or higher) [Appendix 2].

Related to the relevance of diagnostic techniques used by laboratories included in the AMR surveillance system, four of the 11 countries have minor modifications in the AST. Bacterial isolation and identification protocols used would improve their adaptation to the national AMR surveillance objectives (Level D). On the technical level of data management of the laboratory network in the AMR surveillance system, most laboratories of the network in four of 11 countries use computers to manage parts of their data but major improvements in the system are required (Level C).

Countries that have effective integration of laboratories in the AMR surveillance network are more likely to have significant progress on standardization and harmonization of procedures, relevance of diagnostic techniques, and data management. Around 4 of 11 countries of the SEA Region present those 3–4 aspects while recording progress at Level C or higher [Appendix 2].



Reducing the incidence of infection through effective sanitation, hygiene and infection prevention measures

Some sub-indicators are related to infection prevention and control (IPC) and the antimicrobial stewardship programme (AMSP). These include: AMSP in health-care settings; IPC programme in health-care settings; national health-care-associated infections (HAI) and related AMR surveillance; and sanitation, hygiene and vaccination [4]. Substantial progress in addressing AMR is expected through some measurement indicator such as immunization, infection prevention and control (IPC) procedures, and enhanced biosecurity in health-care facilities, and on farms and environmental sanitation in the community [1].

There were various levels of success in different countries. Some countries had adopted measures to install biosecurity practices in the animal sector and developed SOPs for government-manned farms, with guidelines for small and backyard farms. Other countries had undertaken training to strengthen the implementation of biosecurity measures and conducted regular audits for farms [3]. Most countries of the SEA Region already have a national infection prevention and control (IPC) programme and operational plans and national guidelines in human health care.

Selected health facilities are implementing the guidelines, with monitoring and feedback in place (Level C). Regionally, progress on good health, management and hygiene practices to reduce the use of antimicrobials and minimize development and transmission of AMR in animal production (terrestrial and aquatic), as well as to reduce the development and transmission of AMR in food processing, has been made. AMSP will be explained further in the chapter on optimizing the use of antimicrobial medicines in human, animal and plant health.

7.1 Regional progress

Human sector

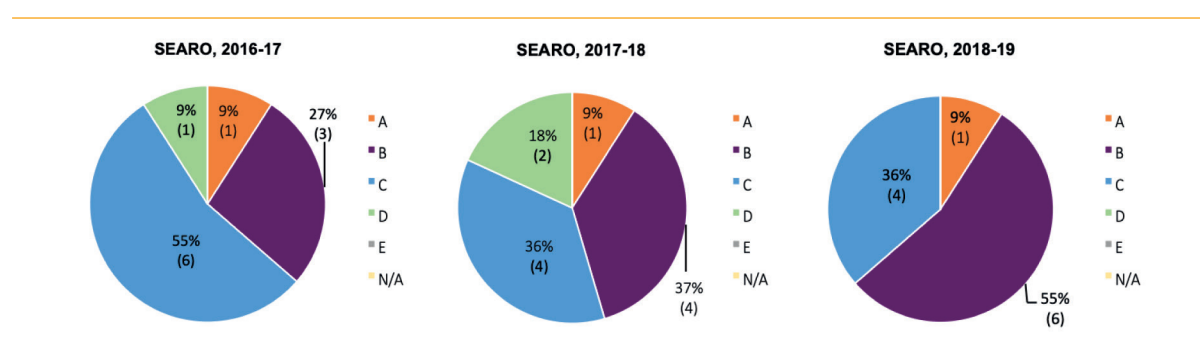
Globally, more than half of the countries report having acted to reduce the incidence of infection through sanitation, hygiene and infection prevention measures. Around 58.4% of countries have achieved Level C or higher on the infection prevention and control (IPC) indicator in human health (i.e. a national IPC programme or operational plan is available and national guidelines for IPC in health care are available and disseminated), and 14.9% have reached Level E where compliance and effectiveness are evaluated and published.



There is a relationship between progress on this indicator and government health-care spending; for every 1% increase in government health-care spending as a percentage of GDP, the odds of a country having a functioning IPC programme are 1.3 times higher [1]. Progress has been made on IPC in human health care regionally among all countries of the SEA Region. A national IPC programme or operational plan is available. Around 91% of countries of the SEA Region have at least maintained the existing national IPC and water, sanitation and hygiene (WASH) and environmental health standards (Level B).

The national IPC programme is available according to the WHO IPC core components guidelines and IPC plans and guidelines were implemented nationwide in 9% of SEA Region countries in 2016–2017, which increased to 18% in 2017–2018. All health-care facilities in these countries of the SEA Region have a functional built-in environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards (Level D). However, the reduced progress at Levels C and D is an indication of a decline in progress on IPC in human health care.

Figure 26: Regional progress on infection prevention and control in human health care (2016–2017, 2017–2018, 2018–2019)



- A = No national IPC programme or operational plan is available.
- B = A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C = A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D = National IPC programme available according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E = IPC programmes are in place and functioning at national and health facility levels according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.

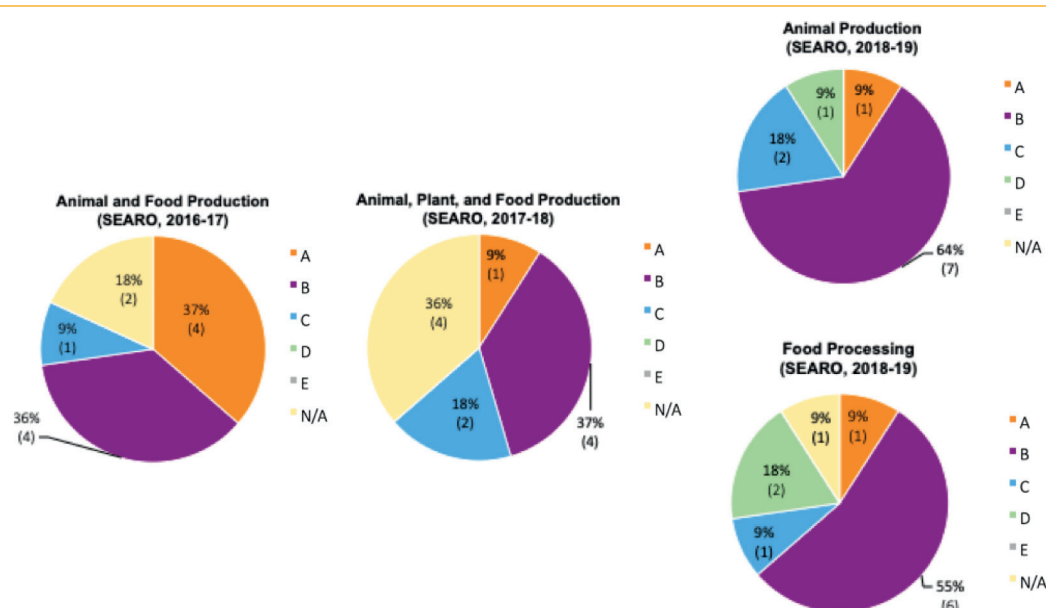
Non-human sector

Globally, in non-human sectors, the animal and food sectors have demonstrated the most activity [1]. Regionally, progress on good health, management and hygiene practices to reduce the use of antimicrobials and minimize development and transmission of AMR in animal production (terrestrial and aquatic) as well as to reduce the development and transmission of AMR in food processing, has been achieved.

Around 45% of countries of the SEA Region (2016–2017) agreed to promote farm hygiene, increase vaccination, biosecurity, and appropriate handling of sick animals to prevent transmission of resistant bacteria to other animals and humans (36% Level B and 9% Level C). Additionally, 55% of countries of the SEA Region (2017–2018) have some activities in place to develop and promote good production practices (37% at Level B and 18% at Level C).

This progress level increased in 2018–2019: 91% of countries are in Level B in the animal production sector and 82% of countries are in Level B for the food processing sector. In 2018–2019, around 9% of countries of the SEA Region (for animal production) and 18% of countries of the SEA Region (for food processing) have implemented plans nationwide to ensure good production practices and national guidance has been published and disseminated (Level D).

Figure 27: Regional progress on good health, management and hygiene practices (2016–2017, 2017–2018, 2018–2019)



Animal and Food Production (2016–2017)

- A = No systematic efforts to improve infection prevention in the animal and food production sectors related to reducing use of antimicrobials.
- B = Plan agreed to promote farm hygiene, increase vaccination, biosecurity and appropriate handling of sick animals to prevent transmission of resistant bacteria to other animals and humans.
- C = Implementation of plan for infection prevention in food producing animals for some species, types of farms or geographical areas based on intergovernmental standards. Practical guidance developed and disseminated.
- D = Nationwide implementation of plan for infection prevention in animals in public and private sectors and in collaboration with veterinarians.
- E = Monitoring of progress on infection prevention relevant to reducing use of antimicrobials in animals, veterinary practices and food chains, with updating of plans and guidance in response to findings.

Animal, plant and food production (2017–2018, 2018–2019)

- A = No systematic efforts to improve good production practices.
- B = Some activities in place to develop and promote good production practices.
- C = National plan agreed to ensure good production practices in line with international standards (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius). Nationally agreed guidance for good production practices developed, adapted for implementation at local farm and food production level.



- D = Nationwide implementation of plan to ensure good production practices and national guidance published and disseminated.
- E = Nationwide implementation of plan to ensure good production practices and monitoring of impact on level of AMR, on animal health and welfare, and on production, with updating of plans and guidance in response to findings.

Food processing (2018–2019)

- A = No systematic efforts to improve good management and hygiene practices.
- B = Some activities in place to develop and promote good management and hygiene practices.
- C = National plan agreed to ensure good management and hygiene practices in line with international standards (e.g. Codex Alimentarius). Nationally agreed guidance for good practices developed and adapted for implementation according to local food processing approaches.
- D = Nationwide implementation of plan to ensure good management and hygiene practices and national guidance published and disseminated.

7.2 Country progress

Globally, the vaccination coverage rate in many countries is still low. The average pneumococcus vaccine immunization rate was 87.4% for high-income countries, 65.2% for upper-middle-income countries, 70.8% for lower-middle-income countries and 70.8% for low-income countries [1]. Based on TrACSS 2018–2019; across the SEA Region, the average vaccination rate for pneumococcus vaccine is 88.85%, which is equivalent to the coverage rate in high-income countries globally [Appendix 2].

Overall, the average *Haemophilus influenzae* type B (HiB) vaccine immunization rate is higher across higher-income countries and regions. The average rate was 94.4% for high-income countries, 84.4% for upper-middle-income countries, 83.2% for lower-middle-income countries and 83.2% for low-income countries [1]. Based on TrACSS 2018–2019; across the SEA Region, the average vaccination rate for *Haemophilus influenzae* type B (HiB) vaccine is 91.03%, which is equivalent to the coverage rate in high-income countries globally [Appendix 2].

Access to basic water supplies, basic hand hygiene facilities and functional sanitation facilities are also lacking in health-care centres in many parts of the world [1]. Based on TrACSS 2018–2019; across the SEA Region, the average proportion of health-care facilities with basic water supplies represents 92.74%, those with basic hand hygiene facilities 82.14%, and functional sanitation facilities constitute 90.88% of the total [Appendix 2].

Human sector

Country progress has been made on IPC in human health care among countries of the SEA Region. In general, a national IPC programme or operational plan is available in all countries. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented (Level B) [Appendix 2]. In 2016–2017 and 2017–2018, around nine of 11 countries had a national IPC programme in place and operational plans and national guidelines for IPC health care are available and disseminated in them. Selected health facilities are implementing the guidelines with monitoring and feedback in place (Level C).

Moreover, three of those countries have a national IPC programme according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health-care facilities in those three countries have a functionally built environment (including water and sanitation), and necessary materials and equipment to perform IPC as per national standards (Level D) [Table 5–8, 10–14]. However, eight of 10 countries experienced a decrease in progress from Level C



and D to a lower level, while the other three tended to show stagnant progress. Besides, four countries of the SEA Region experienced a decline in level of progress in 2017–2018, and four other countries of the Region in 2018–2019 [Appendix 2].

Non-human sector

Country progress on good health, management and hygiene practices to reduce the use of antimicrobials and minimize development and transmission of AMR in animal production (terrestrial and aquatic) as well as to reduce the development and transmission of AMR in food processing has been recorded [Appendix 2]. Five out of 11 countries of the Region (2016–2017) agreed to promote farm hygiene, increase vaccination, biosecurity and appropriate handling of sick animals to prevent transmission of resistant bacteria to other animals and humans (at least Level B) [Table 5,7–8,10,13]. Furthermore, six of the 11 countries (2017–2018) have some activities in place to develop and promote good production practices (at least Level B) [Table 4–7,9,11].

In 2017–2018, there was no data explaining the details of the level of good health, management and hygiene practices in five non-human sectors. However, in general, progress in two of 11 countries of the SEA Region was at level B [Table 4, 11]. On the other hand, progress in four other countries of the Region was explained through several categories of non-human sectors, such as animal health, plant health, food production, food safety, and the environment [Table 8,10,12–13]. This progress level has increased in 2018–2019: at least 10 of the 11 countries in animal production sector and nine of 11 countries in food processing sector have some activities in place to develop and promote good management and hygiene practices (Level B). In 2018–2019, three of those countries had progressed to Level C or higher [Appendix 2].



Optimizing the use of antimicrobial medicines in human, animal and plant health

The GAP-AMR calls upon all countries to conserve antimicrobial effectiveness by ensuring the provision of antimicrobial stewardship programmes, removing incentives that encourage antimicrobial overuse, and implementing policies and regulations to preserve antimicrobial effectiveness. The need for progress is buoyed by ongoing concerns about the quality of antimicrobials, the rise in substandard and falsified medicines globally, and the impact of consuming these substandard or falsified products on animal and human health [1].

Some sub-indicators are related to the rational use of antimicrobials and surveillance of use/sale in the community, such as a national AMR containment policy for control of human use of antimicrobials; antimicrobial stewardship (AMS); national regulatory authority (NRA)/drug regulatory authority (DRA); surveillance of antimicrobial use and sales in humans; regulation of finished antibiotics and active pharmaceutical ingredients (APIs); regulation of pharmacies on over-the-counter (OTC) sale and inappropriate sale of antibiotics and APIs [4].

Regionally, progress on implementation of country policy on antimicrobial use in humans has been achieved and most countries have national policies and regulations in place for antimicrobial stewardship for the community and health-care settings. Progress related to policies for antimicrobial use in non-humans has also been made. The progress on the prohibition of use of antibiotics for growth promotion in the absence of risk analysis is greater than the progress made on use of prescription and sale of antimicrobials for animal use. On the other hand, risk assessment for AMR transmission in the environment is classified into whether high-risk locations have been identified and whether risk reduction actions are underway. As for progress on legislation and/or regulations to mitigate risk, these are grouped into specific AMR addresses such as whether it impacts AMR, and whether it has a functioning system for monitoring compliance and enforcement.

8.1 Regional progress

Human sector

Globally, around 79.9% countries have policies in place to regulate the sale of antimicrobials, including the requirement of a prescription for human use, i.e. a policy that has been shown to be effective in reducing antimicrobial use in some parts of the world [1]. Regionally, progress has been



made on the policy and legal status of antimicrobial use for humans. Around 82% of countries of the SEA Region reported in 2017–2018 that they have country laws or regulations on prescription and sale of antimicrobials for human use. This improved to 100% in 2018–2019 among countries of the SEA Region.

Figure 28: Regional progress on country policies for antimicrobial use in humans (2017–2018, 2018–2019)

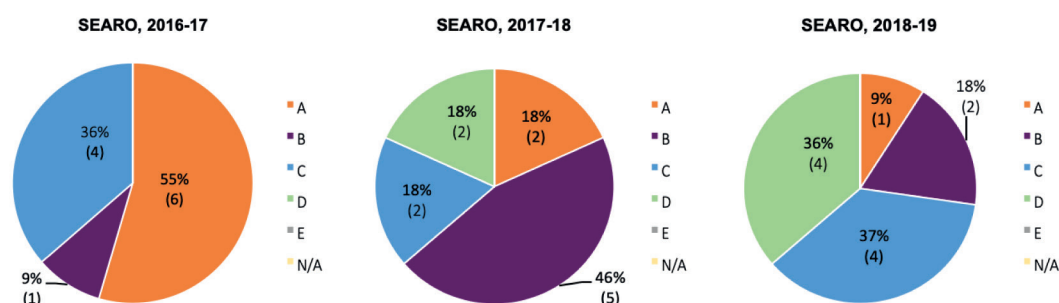


Globally, policies to regulate the sale of antimicrobials, including the requirements of a prescription for human use, are less common in low-income countries. Around 66.2% of countries have policies to optimize antimicrobial use at Level C or higher; however, only seven countries globally have reached Level E and are systematically sending data back to prescribers. Another policy exists for reducing the prescribing of antimicrobials among physicians. However, 26.6% of countries have guidelines in place to enable appropriate use of antimicrobials or optimize antibiotic use (Level D-E) in human health facilities [1]. Regionally, progress has been achieved on antimicrobial use and antimicrobial stewardship in the human sector.

National antimicrobial stewardship programme in 36% of countries of the SEA Region (2016–2017) has been implemented in some health-care facilities. Planned legal/regulatory changes are being introduced to regulate access to antibiotics for human use (Level C). Even in eight of 11 countries of the SEA Region (2018–2019), practices to ensure appropriate antimicrobial use are implemented in some health-care facilities and guidelines for appropriate use of antimicrobials are available (Level C). In four countries of the SEA Region (2018–2019), guidelines and other practices to enable appropriate use have been implemented in most health facilities nationwide. Monitoring and surveillance results are used to inform action and to update treatment guidelines and essential medicines lists (Level D).



Figure 29: Regional progress on antimicrobial use and antimicrobial stewardship in the human sector (2016–2017, 2017–2018, 2018–2019)



2016–2017

A = No/weak national policy & regulations for antimicrobial stewardship

B = National policy and regulations for antimicrobial stewardship developed & approved, that address use, availability and quality of antibiotics in the community and in health care settings.

C = National antimicrobial stewardship program is being implemented in some healthcare facilities. Planned legal/regulatory changes are being introduced to regulate access to antibiotics for human use.

D = Antimicrobial stewardship programme is implemented in health-care facilities nationwide. Legal/regulatory changes approved and publicized to regulate sales and products for human use, but not fully enforced. Antibiotic quality testing programme operational.

E = Antimicrobial stewardship program is implemented in most health care facilities and in community. Regulations are enforced on access to antibiotics and use in human health. Monitoring and surveillance results are used to inform action and to update treatment guidelines and essential medicines lists.

2017–2018, 2018–2019

A = No/weak national policies for appropriate use.

B = National policies for antimicrobial governance developed for the community and health-care settings.

C = Practices to assure appropriate antimicrobial use being implemented in some healthcare facilities and guidelines for appropriate use of antimicrobials available.

D = Guidelines and other practices to enable appropriate use are implemented in most health facilities nationwide. Monitoring and surveillance results are used to inform action and to update treatment guidelines and essential medicines lists.

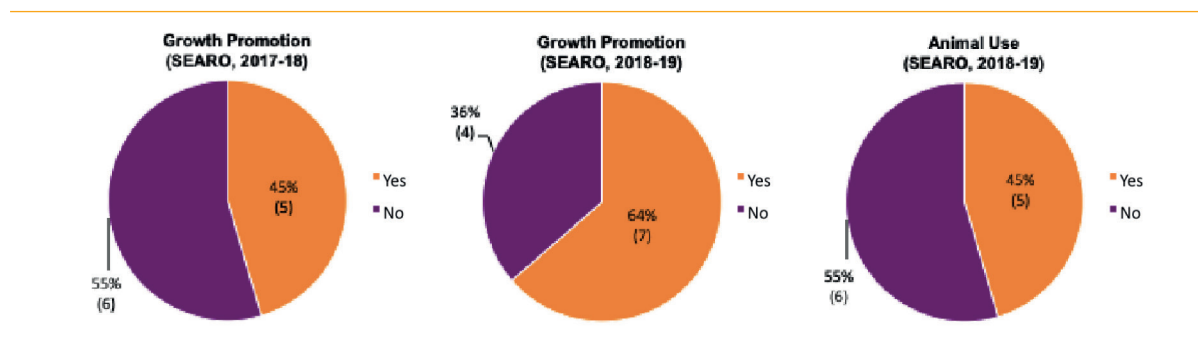
E = Guidelines on optimizing antibiotic use are implemented for all major syndromes and data on use is systematically fed back to prescriber

Non-human sector

The GAP-AMR called upon all countries to conserve antimicrobial effectiveness by ensuring the implementation of policies and regulations [1]. Regionally, progress on the implementation of antimicrobial use policies and legal status for non-human use (i.e. animal use and growth promotion) has been made among countries of the SEA Region. In 2018–2019, about 45% of countries of the SEA Region had laws or regulations on prescription and sale of antimicrobials for animal use in place. This progress is not as widespread as the number of countries that have laws or regulations that prohibit the use of antibiotics for growth promotion in the absence of risk analysis, which has been made by seven of the 11 countries of the SEA Region.



Figure 30: Regional progress on country policies for antimicrobial use in non-human sector (2017–2018, 2018–2019)



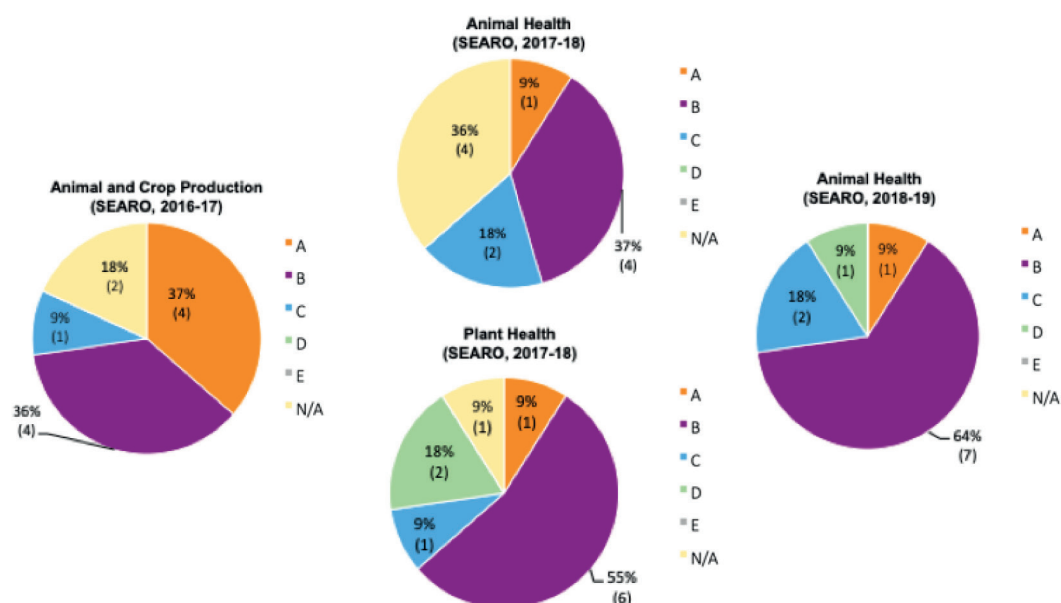
Globally, from a point of view of regulatory oversight of the supply chain and market approvals, nearly one-fifth of countries have no national policy or legislation regarding the quality, safety and efficacy of antimicrobial products, and their distribution, sale or use. Another 18.2% countries were unable to report whether they had these policies in place. Finally, only 41.6% countries have limited use of critical antimicrobials (human and animal) for growth promotion in animal production. Interestingly, the presence of these regulations does not appear to be correlated with the presence of animal health representatives in the country's multisectoral AMR working groups [1].

Regionally, progress has been achieved among countries of the SEA Region on antimicrobial use and antimicrobial stewardship in the non-human sectors (i.e. animal and crop production, animal and plant health). In 2016–2017, the national policy for antimicrobial stewardship and governance was developed in at least 45% of countries addressing appropriate use, and availability and quality of antimicrobials for animal use (Level B). Legislation and regulations in 9% of those countries were approved on import, marketing authorization, production, distribution and prudent use of high-quality veterinary medicinal products including antimicrobials, based on international standards (Level C). In 2017–2018, national legislation in at least 55% of countries of the SEA Region covered some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy, and distribution of antimicrobial products for animal health (Level B). In about 18% of those countries of the Region all aspects (Level C) were covered.

The level of progress in animal health is not as significant as plant health, in which 82% of the countries of the SEA Region (2017–2018) reached at least Level B or higher. In addition, 18% of those countries have effective enforcement processes and controls in place to ensure legislative compliance. However, progress in animal health was significant in 2018–2019 with around 91% of countries reaching Level B or higher. Again, 9% of those countries have a national regulatory framework for products that incorporates all the elements included in the related international standards on responsible and prudent use of antimicrobials (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius) according to the specific animal species and/or production sector (Level D).



Figure 31: Regional progress on antimicrobial use and antimicrobial stewardship in non-human sectors (2016–2017, 2017–2018, 2018–2019)



2016–2017

- A = No national policy or legislation regarding the quality and efficacy of antimicrobials and their use in animals, and crops.
- B = National policy for antimicrobial stewardship and governance developed, that addresses appropriate use, availability and quality of antimicrobials for animal use.
- C = Legislation and regulations approved on import, marketing authorization, production, distribution and prudent use of high-quality veterinary medicinal products including antimicrobials, based on international standards.
- D = Implementation of legislation and regulations on responsible and prudent use of antimicrobials in animals and ensuring safe food supplies. Prescriptions are required for antimicrobial use in animals. Use of antimicrobials for animal growth promotion has been phased out.
- E = Antimicrobials given to animals are only used to control or treat infectious diseases, under veterinary supervision. Regulations are enforced on access to antimicrobials and their use in animals, crop production, and to otherwise prevent food contamination with antimicrobial residues in compliance with Codex Alimentarius standards.

2017–2018

- A = No national policy or legislation regarding the quality, safety and efficacy of antimicrobial products, and their distribution, sale or use.
- B = National legislation covers some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
- C = National legislation covers all aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
- D = Effective enforcement processes and control are in place to ensure compliance with legislation.
- E = Guidelines for responsible and prudent use of antimicrobials based on international standards (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius) are available according to animal species and/or production sector and include restriction of specific antimicrobial classes listed as critically important for humans and animals.

2018–2019

- A = No national policy or legislation regarding the quality, safety and efficacy of antimicrobial products, and their distribution, sale or use.
- B = National legislation covers some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
- C = National legislation covers all aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
- D = The national regulatory framework⁴ for AM products incorporates all the elements included in the related international standards on responsible and prudent use of antimicrobials (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius) according to animal species and/or production sector.
- E = Enforcement processes and control are in place to ensure compliance with legislation.

National assessment of risks for AMR transmission in the environment and pollution control is one integral part that supports the achievement of Strategic Objective 4. Regionally, progress on risk assessment for AMR transmission in the environment is classified into whether high-risk locations have been identified and whether risk reduction actions are underway. Based on the risk for AMR transmissions, most of them indicate that they do not have high-risk locations that have been identified, except for 36% of human sewage (including wastewater and sludge) quality (for re-use) that has high-risk locations and have been identified.

The four highest risks for AMR transmission that have a high-risk location and have been identified in addition to human sewage (for re-use) are as follows: human health facilities without access to safe water supply and sanitation; human sewage (for disposal in the environment); wastewater discharges from manufacturing sites for antimicrobial agents; and disposal of products contaminated with AM residues (such as food, plant or animal products with residues over the maximum residue limit/MRL).

On the other hand, risk reduction actions are underway for most risk factors of AMR transmission, except for 45% of human sewage (including wastewater and sludge) quality (for disposal in the environment), which does not have risk reduction actions underway. The four highest areas of risk for AMR transmission that have no risk reduction actions underway other than human sewage (for disposal in the environment) are human health facilities without access to safe water supply and sanitation; wastewater discharges from health facilities for disposal in the environment; wastewater discharges from manufacturing sites for antimicrobial agents; and disposal of unused medicines antimicrobial agents.

Based on those two risk assessments, high risk for AMR transmission in countries of the SEA Region are posed by human health facilities without access to safe water supply and sanitation; and wastewater discharges from manufacturing sites for antimicrobial agents (either as active pharmaceutical ingredients (API) or finished products).

⁴ Including legislation, standards, guidelines and other regulatory instruments



Table 2: Regional progress on risk assessment for AMR transmission in the environment (2018–2019)

Risk assessments		Risks for AMR transmission									
		1	2	3a	3b	4	5a	5b	6	7	8
Have high risk locations been identified?	Yes	18%	27%	27%	36%	18%	9%	18%	27%	18%	27%
	No	45%	36%	36%	27%	55%	73%	64%	55%	55%	64%
	N/A	36%	36%	36%	36%	27%	18%	18%	18%	27%	9%
Are risk reduction actions underway?	Yes	55%	36%	27%	45%	36%	45%	64%	55%	45%	64%
	No	18%	36%	45%	9%	27%	18%	0%	27%	36%	18%
	N/A	27%	27%	27%	45%	36%	36%	36%	18%	18%	18%

1 = Areas of a low community access to safe water and sanitation.

2 = Human health facilities without access to safe water supply and sanitation.

3 = Human sewage (including wastewater and sludge) quality

a) Disposal in the environment

b) Re-use

4 = Wastewater discharges from health facilities for disposal in the environment.

5 = Discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure)

a) Disposal in the environment

b) Re-use

6 = Wastewater discharges from manufacturing sites for antimicrobial agents (either as active pharmaceutical ingredient (API) or finished products).

7 = Disposal of unused medicines antimicrobial agents. Unused should include left-over products as well as product containers (including pesticides)

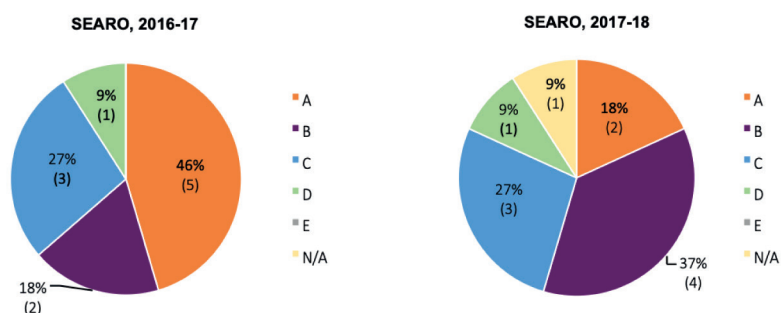
8 = Disposal of products contaminated with AM residues. Such as food, plant or animal products with residues over the MRL (maximum residue limit)

On a global scale, there is substantial room for improvement on regulating the use of antimicrobials in non-human sectors. In general, 50.6% of countries have regulations in place to prevent environmental contamination, and only 10 of these countries have regulations that could limit the discharge of antimicrobial residues into the environment. This level of regulation is insufficient to protect the environment from the hazards of antimicrobial production [1].

Regionally, progress on antimicrobial contamination regulations for the environment has been made among countries of the SEA Region. In 54% of countries of the SEA Region in 2016–2017, legislation and/or regulations are in place to control at least the release of human sewage into the environment (Level B) and this increased to 73% of countries in 2017–2018. In 27% of those countries (both in 2016–2017 and 2017–2018), legislation and/or regulations encompass release of sewage, discharge from wastewater from health facilities, manure from intensive animal production, and industrial effluents to the environment (Level C). Nine per cent of countries already have a functioning system for monitoring regulatory compliance of discharge into the environment for some types of waste (Level D).



Figure 32: Regional progress on antimicrobial contamination regulation for the environment (2016–2017, 2017–2018)



2016–2017

- A = No legislation regarding control of wastewater discharges to the environment.
- B = Legislation and/or regulations are in place to control wastewater discharges from sewage to the environment.
- C = Legislation and/or regulations include discharge of wastewater from health facilities, manure from animals, and industrial effluent to the environment. There is a regulatory compliance system for wastewater discharges to the environment for some types of waste (sewage, health facilities, agriculture, manure and/or industrial effluent).
- D = There is a functioning regulatory compliance system nationwide for all types of waste/wastewater (sewage, health facilities, agriculture, manure and industrial effluent) to the environment.
- E = Regulations are in place that limit discharge of antimicrobial residues into the environment, including in municipal and pharmaceutical industry waste and wastewater. A regulatory compliance system is functioning that includes compliance with regulations on antimicrobial residues.

2017–2018

- A = No legislation regarding control of waste discharge (sewage, health facilities, agriculture, manure and industrial effluent) into the environment.
- B = Legislation and/or regulations are in place to control at least the release of human sewage into the environment.
- C = Legislation and/or regulations encompass release of sewage, discharge of wastewater from health facilities, manure from intensive animal production, and industrial effluent to the environment.
- D = There is a functioning system for monitoring regulatory compliance of discharge to the environment for some types of waste (sewage, health facilities, agriculture, manure and/or industrial effluent).
- E = There is a functioning system for monitoring regulatory compliance of all waste discharge to the environment (sewage, health facilities, agriculture, manure and industrial effluent). Regulations are in place that limit discharge of all antimicrobial residues into the environment, including in municipal and pharmaceutical industry waste and wastewater.

Legislation and/or regulations to prevent contamination of the environment with antimicrobials are one essential part to achieve the Strategic Objective 4. Regionally, progress on legislation and/or regulations to mitigate risk are grouped into whether these specifically address AMR, whether they impact AMR, and whether there is a functioning system for monitoring compliance and enforcement.

Based on the risk for AMR transmissions among countries of the SEA Region, legislation and/or regulations to prevent contamination of the environment with antimicrobials have already addressed the risk of AMR transmissions: 91% of countries have addressed this risk in the areas of wastewater discharges from manufacturing sites for antimicrobial agents (either as active pharmaceutical ingredients or finished products), disposal of unused medicines antimicrobial agents (unused should include left-over products and also product containers including pesticides), and disposal of products contaminated with antimicrobial residues (such as food, plant or animal products with residues over the maximum residue limit).

Most legislation and/or regulations to prevent contamination of the environment with antimicrobials also have an impact on AMR in almost all risks for AMR transmission, especially for 64% of countries of the SEA Region with respect to discharges from intensive animals (terrestrial and aquatic) production (liquid waste and manure) in the re-use context. Legislation and/or regulations in most countries of the SEA Region also have provisions for functioning systems to monitor compliance. About 73% of countries of the Region have these provisions for human sewage (including wastewater and sludge) quality (for disposal in the environment) and 64% of countries for disposal of wastewater discharge from health facilities into the environment.

Table 3: Regional progress on risk mitigation legislation and/or regulations for environment (2018–2019)

Legislation and/or regulation to mitigate risks		Risks for AMR transmission							
		3a	3b	4	5a	5b	6	7	8
That specifically addresses AMR *	Yes	82%	73%	82%	73%	73%	91%	91%	91%
	No	9%	0%	0%	9%	0%	9%	0%	0%
	N/A	9%	27%	18%	18%	27%	0%	9%	9%
That impacts AMR **	Yes	55%	55%	55%	55%	64%	55%	45%	55%
	No	36%	18%	36%	36%	18%	27%	36%	27%
	N/A	9%	27%	9%	9%	18%	18%	18%	18%
That has a functioning system for monitoring compliance and enforcement	Yes	73%	55%	64%	45%	55%	45%	45%	55%
	No	18%	18%	18%	27%	9%	36%	36%	27%
	N/A	9%	27%	18%	27%	36%	18%	18%	18%

* This refers to policy, legal and other regulatory mechanisms that specifically address AMR

** This refers to legislation that does not include specific references to AMR but where existing regulatory mechanisms (licenses, permits) may serve to address AMR.

3 = Human sewage (including wastewater and sludge) quality

a) Disposal in the environment

b) Re-use

4 = Wastewater discharges from health facilities for disposal in the environment.

5 = Discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure)

a) Disposal in the environment

b) Re-use

6 = Wastewater discharges from manufacturing sites for antimicrobial agents (either as active pharmaceutical ingredient (API) or finished products).

7 = Disposal of unused medicines antimicrobial agents. Unused should include left-over products as well as product containers (including pesticides)

8 = Disposal of products contaminated with AM residues. Such as food, plant or animal products with residues over the MRL (maximum residue limit)



8.2 Country progress

Human sector

Globally, around 79.9% countries have policies in place to regulate the sale of antimicrobials including the requirements of a prescription for human use, which is a policy that has been shown to be effective in reducing antimicrobial use in some parts of the world [1]. Regionally, progress on antimicrobial use policy and legal status for human use has been recorded: nine of the 11 countries in 2017–2018 reported that they have laws or regulations on prescription and sale of antimicrobials for human use. This improved to 100% among countries of the SEA Region in 2018–2019 [Appendix 2].

Country progress on antimicrobial use and antimicrobial stewardship in the human sector has also been achieved: nine of 11 countries of the Region have progressed to Level C, of which four countries are at Level D [Table 5–10,12–14]. In four of 11 countries in 2016–2017, the national antimicrobial stewardship programme had been implemented in some health-care facilities. Planned legal/regulatory changes are being introduced to regulate access to antibiotics for human use (Level C).

In addition, eight of 11 countries of the SEA Region had implemented by 2018–2019 practices to assure appropriate antimicrobial use in some health-care facilities and adhere to guidelines for appropriate use of antimicrobials available (Level C). In four of those countries (2018–2019), guidelines and other practices to enable appropriate use are being implemented in nationwide health facilities. Monitoring and surveillance results are used to inform action and update treatment guidelines and essential medicines lists (Level D). However, there are two countries that have shown declining progress on antimicrobial use and antimicrobial stewardship in the human sector [Appendix 2].

Non-human sector

The GAP-AMR called upon all countries to conserve antimicrobial effectiveness by ensuring the implementation of policies and regulations [1]. Regionally, country progress on antimicrobial use policy and legal status for non-human use (i.e. animal use and growth promotion) has been made among countries of the SEA Region [Appendix 2]. By 2018–2019, five of the 11 countries had laws or regulations in place on prescription and sale of antimicrobials for animal use [Table 4–5,8,12–13].

This progress is not as significant as seven of 11 countries have laws or regulations prohibiting the use of antibiotics for growth promotion in the absence of risk analysis [Table 4–5,8,10–13]. Five out of 11 countries have laws or regulations both on prescription and sale of antimicrobials for animal use, and on prohibiting the use of antibiotics for growth promotion [Table 4–5,8,12–13], while four other countries of the SEA Region do not have any of these regulations yet [Table 6–7,9,14].

In terms of regulatory oversight of the supply chain and market approvals on a global scale, nearly one-fifth of the countries have no national policy or legislation regarding quality, safety and efficacy of antimicrobial products, and their distribution, sale or use. Globally, only 41.6% countries have limited use of critical antimicrobials (human and animal) for growth promotion in animal production [1].

Country progress among countries of the SEA Region on antimicrobial use and antimicrobial stewardship in non-human sectors (i.e. animal and crop production, animal and plant health) has been made [Appendix 2]. In 2016–2017, legislation and regulations in three of the 11 countries of the SEA Region were approved on import, marketing authorization, production, distribution and prudent



use of high-quality veterinary medicinal products including antimicrobials, based on international standards (Level C) [Table 7–8,13]. However, there are still many countries in the SEA Region that do not have in place national policy or legislation regarding the quality and efficacy of antimicrobials and their use in animals and crops.

As of 2017–2018, national legislation in four of the 11 countries covered some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products (Level B): two of those countries of the SEA Region not only cover all aspects (Level C) but also have effective enforcement processes and controls in place to ensure compliance with legislation for animal health (Level D).

Progress levels for animal health improved from 2018–2019 because by then national legislation in four of the 11 countries had covered all aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy, and distribution of antimicrobial products (Level C). Furthermore, one country had enforcement processes and controls in place to ensure compliance with legislation for animal health (Level E). In general, around five of the 11 countries consistently showed progress from 2016–2017 to 2017–2018 and 2018–2019, both in animal and crop production and animal and plant health [Appendix 2].

Country progress on risk assessment for AMR transmission in the environment is classified according to whether high-risk locations have been identified and whether risk reduction actions are underway. In general, most countries have carried out risk assessments for more than five risks for AMR transmission [Appendix 2]. As mentioned earlier, some high-risk areas for AMR transmission in countries of the SEA Region are human health facilities without access to safe water supply and sanitation; and wastewater discharges from manufacturing sites for antimicrobial agents (either as active pharmaceutical ingredients or finished products).

However, the high number of data that is not available at some risk areas for AMR transmission needs further assessment, especially in places with low community access to safe water and sanitation, human sewage (including wastewater and sludge) quality (both for disposal in the environment and re-use), and wastewater discharges from health facilities for disposal in the environment.

Progress on antimicrobial contamination regulations for the environment has been made among countries of the SEA Region: six of 11 countries of the SEA Region have legislation and/or regulations encompassing release of sewage, discharge from wastewater from health facilities, manure from intensive animal production, and industrial effluents that are released into the environment (Level C). Two of those countries already have a functioning system for monitoring regulatory compliance of discharge into the environment for some types of waste (Level D) [Table 6–7,10–13]. However, some countries of the SEA Region had experienced a decrease in progress from Level C or D or to a lower level in 2017–2018 [Appendix 2].

Legislation and/or regulations to prevent contamination of the environment with antimicrobials are one part of the core developments that support the achievement of Strategic Objective 4. Progress levels on legislation and/or regulations to mitigate risk are grouped into whether they specifically address AMR, whether these laws impact AMR, and whether there is a functioning system for monitoring compliance and enforcement.



Country progress on risk mitigation legislation and/or regulations for the environment are as follows: in seven of 11 countries of the SEA Region AMR is specifically addressed in all risks for AMR transmission. Three of those countries also have legislation that monitors the impact on AMR and have a functioning system for monitoring compliance and enforcement in all risk areas for AMR transmission [Table 5, 8–9, 11–14]. However, some other countries of the SEA Region do not yet have data related to this information, especially on the risk of AMR transmissions related to human sewage (including wastewater and sludge) quality (re-use context) and discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) in both the disposal into the environment and re-use contexts [Appendix 2].



Overall implementation and monitoring

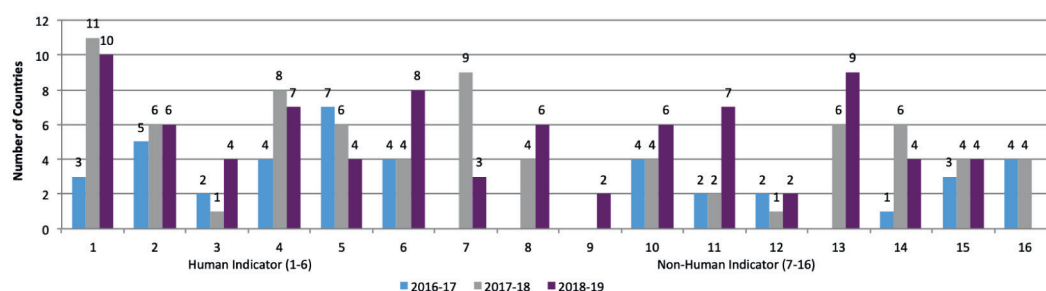
Concern has been expressed that countries are developing plans but not moving forward into the implementation phase. This survey suggests that most countries have achieved different levels of progress in several domains. The level of implementation (Level C or higher) across the remaining 16 key domains or questions in the survey was calculated among the countries achieving Level B or higher on the national action plan indicator and the multisectoral engagement indicators. The number of countries that have implemented all domains in the human sector is higher, suggesting that there is a need to scale up actions to address AMR in animals, plants and the environment [1].

Progress on NAP-AMR indicators that were comprehensively implemented has been made: at least three NAP-AMR indicators (2017–2018) and four NAP-AMR indicators (2018–2019) are being implemented by all countries of the SEA Region at Level C or higher. The total implemented NAP-AMR indicator (Level C or higher) has increased in seven of 11 countries in 2017–2018 and in six of 11 countries in 2018–2019. The progress level on three of six human indicators improved in 2017–2018 and five of 10 non-human indicators improved in 2018–2019.

In terms of how the indicators improved in countries, 17 out of the 20 indicators assessed in 2016–2017 showed progress in 2018–2019. The maximum progress was made in sanitation and hygiene programmes in community settings, raising awareness among the general public, education and training, NAP-AMR and governance structure, regulations dealing with antimicrobials and APIs, strengthening of the national laboratory network, surveillance of antimicrobial use and sales among humans, and regulation of over-the-counter sales [3].



Figure 33: Regional progress on implementation of each NAP-AMR indicator (2016–2017, 2017–2018, 2018–2019)



1. Raising awareness and understanding of antibiotic resistance risks and response in human health
2. Training and professional education on AMR in the human health sector
3. National monitoring system for consumption and rational use of antimicrobials in human health
4. National surveillance system for antimicrobial resistance (AMR) in humans
5. Infection prevention and control (IPC) in human health care
6. Optimizing antimicrobial use in human health
7. Raising awareness and understanding of AMR risks and response in animal health, plant health, food production, food safety, and environment sectors
8. Training and professional education on AMR in the veterinary sector
9. Training and professional education on AMR in farming sector (animal and plant), food production, food safety and the environment
10. Progress with strengthening veterinary services
11. National monitoring system for antimicrobials intended to be used in animals (sales/use)
12. National monitoring system for antimicrobial use (antibiotic and antifungal agents) in plant production
13. National surveillance system for antimicrobial resistance (AMR) in animals, plants, foods and environment
14. Good health, management and hygiene practices to reduce the use of antimicrobials in animal and plant production and AMR transmission in food production
15. Optimizing antimicrobial use in animal and plant health
16. Legislation and/or regulations to prevent contamination of the environment with antimicrobials

The result of analysis of trends during 2016–2017, 2017–2018 and 2018–2019 shows that regional progress has been made on the implementation of each NAP-AMR indicator. The progress recorded with three of six human indicators has improved in 2017–2018 and five of 10 non-human indicators have also improved in 2018–2019 [Appendix 2]. The top three areas of progress for human indicators most experienced by countries of the SEA Region are raising awareness and understanding of antibiotic resistance risks and responses in human health; national surveillance systems for AMR in humans; and training and/or professional education on AMR in the human health sector.

The top three areas of progress achieved in countries of the SEA Region related to non-human indicators are national surveillance systems for AMR in animals, plants, foods and the environment; progress with strengthening veterinary services; and raising awareness and understanding of AMR risks and responses in animal health, plant health, food production, food safety and the environmental sectors.



On the other hand, the implementation of NAP-AMR indicators still needs to be improved in areas such as national monitoring systems for consumption and rational use of antimicrobials in human health; and training and/or professional education on AMR in the farming sector (animal and plant), food production, food safety and the environment.

Two countries in the SEA Region (2016–2017) implemented six of 16 indicators with progress at Level C or higher and one country in 2016–2017 successfully implemented nine of 16 indicators registering progress at Level C or higher. In 2017–2018, the number of countries implementing seven of 16 indicators increased to four with progress at Level C or higher. Notably, one country of the SEA Region (2017–2018) successfully implemented 13 of 16 indicators with progress at Level C or higher. The total implemented indicators increased to 11 of 16 in three of the 11 countries (2018–2019) with progress at Level C or higher.

Overall, this country progress shows that the implementation of the NAP-AMR indicator has been significant in more countries among the SEA Region. On the other hand, the total implemented NAP-AMR indicator (Level C or higher) increased for seven of 11 countries of the Region in 2017–2018 and for six of 11 countries in 2018–2019, and four of those countries always experienced significant progress during the three survey periods.

The average total NAP-AMR indicators (Level C or higher) implemented among countries of the SEA Region are five indicators (in 2016–2017, with the maximum at nine indicators); seven indicators (in 2017–2018, with the maximum at 13 indicators); and seven indicators (in 2018–2019, the maximum of 11 indicators). However, one of the 11 countries of the Region (2017–2018) and five of the 11 (2018–2019) experienced a slight decrease in progress of the total implemented NAP-AMR indicators [Table 4–14].



Summary of progress

10.1 Global progress

Progress on development of a NAP-AMR has been sustained and more than half of the responding countries have developed NAP-AMR. However, it is important to ensure that NAP-AMR is not only developed but also has funding sources identified, activities implemented by involving relevant sectors, and supported by monitoring and evaluation systems. Most G20 countries are on track to develop and implement NAP-AMR that would serve as a model and provide other countries with technical and financial support. However, progress on AMR monitoring and reporting systems needs to be strengthened as well [1].

The national self-assessment survey clearly showed the importance of a multisectoral and One Health approach to addressing AMR. Countries with large multisectoral AMR working groups are more likely to have more advanced systems for taking NAP-AMR's action. The higher progress in human sectors compared with non-human sectors also been found to reflect the maturity and higher levels of investment in those related programmes. Ensuring that all sectors are playing their part in similar high-level progress is of significance for future progress of GAP-AMR objectives. Despite the multisectoral working groups being developed in most countries, action and investment are needed to ensure that non-human sectors also register significant progress as well [1].

Given that 43 countries reported having no AMR surveillance system for humans, it is also clear that there are some regions where the capacity to detect resistance needs to be strengthened. On the other hand, around 62 responding countries reported having systems to collect national-level data on use in animals. Although some countries have surveillance systems, if they have not participated in GLASS they can have an impact on the effectiveness of data-sharing and progress on global surveillance as part of GAP-AMR objectives. In contrast, 46.4% of the human population lives in countries that monitor antimicrobial consumption or use in humans. Efforts to contain AMR will be greatly advanced by decreasing antimicrobial consumption. Countries should track and benchmark their consumption patterns according to the WHO Essential Medicines List [1].

The available data are insufficient to examine whether there are relationships between rates of antimicrobial use and progress on GAP-AMR objectives. Limited data to link national policies with real-world decrease in antimicrobial use and resistance will continue to be a challenge until greater coverage of national systems for data collection is achieved and global databases are more established.



Activities that have been initiated need to be scaled up, sustained and mainstreamed into ongoing plans and budgets. On the other hand, the Tripartite Organizations have signed a memorandum of understanding showing their commitment to support action, both at the global and country level [1].

10.2 Regional progress

The contexts and national health priorities differ among countries of the SEA Region. While the higher-income countries are focused on emerging infectious disease outbreaks and AMR, the lower-income countries viewed AMR as an abstract concept, looking instead to strengthen local health systems to address endemic and “neglected” diseases.

Not having accurate national estimates on the AMR burden has limited AMR action in many countries, particularly those in the low- and middle-income category (LMIC), in the matter of making a case for substantial investment in containing AMR [3]. However, progress based on the three rounds of AMR country self-assessment survey showed that all countries of the SEA Region have developed NAP-AMR and that progress was sustained.

The plan needs to be improved again with an operational plan, identification of funding sources, and multisector involvement in monitoring and evaluation. Action plans, strategies and targets of NAP-AMR also began to be developed as part of HIV, tuberculosis, malaria and neglected tropical diseases programmes. On the other hand, NAP-AMR also has registered high progress among large meat-producing (chicken-pig-cattle) countries. SEA Region countries with large multisectoral working groups are more likely to have made higher progress on NAP-AMR.

Regarding One Health engagement, some sub-indicators are related to the extent of progress made on the national AMR containment policy and regulatory framework for control of antibiotic use, and registration for use; national surveillance for AMR, and the use and sale of antimicrobials at the national level in the veterinary sector; infection and prevention control; and AMR awareness generation and education [4]. Limited systemic capacity and lack of resources can explain some of the gaps and differences in progress in NAP-AMR implementation across sectors. This could impact One Health engagement and effective multisectoral collaboration [3].

Engagement in multisectoral and One Health working groups was associated with greater progress in implementation across all sectors. Almost all countries of the SEA Region have large multisectoral AMR working groups and more than half of them are functional. In the implementation of NAP-AMR, some countries of the SEA Region have used an integrated approach with relevant data and lessons learned from different sectors.

Related to multisectoral and One Health approaches, the involvement of the sectors on human health, animal health, food safety and environment were higher than plant health and food production sectors. Countries of the SEA Region with large multisectoral and One Health working groups reported have more advanced systems for taking action to address AMR in human and non-human sectors.

Strengthening governance and multisectoral collaboration is a priority, as it helps expand awareness on AMR (emphasized as a continuous effort targeting different sectors and target groups as well as through academic curriculums and training for students and working professionals) [3]. All countries of the SEA Region have some awareness raising activities about the risk of AMR in human health, as well as in animal health, but still less on food production, food safety, plant health and the environment sectors. Progress on awareness raising activities about AMR risk and response did not



ensure progress on AMR training and professional education in both human and non-human sectors. However, it was evidenced that countries of the SEA Region were more likely to register progress on AMR training and professional education in the veterinary sector and strengthen capacity gaps in veterinary services if they have large multisectoral working groups.

Related to GAP-AMR Objective-2, almost all countries of the SEA Region have a national monitoring and surveillance system for antimicrobial use. Some of those countries monitored human health at their national and/or subnational levels and monitored animal health by type of use (therapeutic or growth promotion). Surveillance systems in most countries of the SEA Region also followed national standards with a national reference laboratory that participated in external quality assurance.

Even though some countries of the SEA Region already execute systematic data collection for animal and food sectors, there are still a few countries that have monitoring and surveillance systems for the plant or the environment sector that need to be improved. Countries of the SEA Region with large multisectoral working groups were more likely to have made more progress on national monitoring and surveillance systems as well, both in human and non-human sectors, except on monitoring systems for antimicrobial use in plant production.

Inadequate infrastructure, the absence of skilled manpower, and gaps in operational guidelines and laboratory standard operation procedures have contributed to varying levels of AMR containment activities in most of countries of the SEA Region [3]. In order to reduce the incidence of infection, most countries of the SEA Region already have national infection prevention and control programmes in human health care with monitoring and feedback in place. Those countries of the SEA Region also have national guidelines to reduce the incidence of infection.

Some countries are promoting good health, management and hygiene practices in animal and food production sectors. Some of the related national plans have been in line with international standards (both for animal production and food processing). Some of those programmes not only support high immunization coverage for pneumococcus and *Haemophilus influenzae type B* vaccine; but also support better readiness for water supplies, basic hand hygiene facilities, and functional sanitation facilities.

Most countries of the SEA Region have policies on prescriptions and sale of antimicrobials, both in human use, growth promotion and animal use. Related to policies in human use. Several countries of the SEA Region have implemented a national antimicrobial stewardship programme in some health-care facilities; and most of them have appropriate use guidelines supported by monitoring and surveillance systems to inform action and to update treatment guidelines and essential medicines lists.

Related to animal and crop production, almost all countries of the SEA Region already have legislation covering some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy, and distribution of antimicrobial products. A framework incorporating with international standards is in place in some countries of the SEA Region. On the other hand, most countries of the SEA Region also did not have high-risk locations that have been identified but still keep risk reduction actions underway in almost all risk areas for AMR transmissions. Policies that prevent contamination of the environment in countries of the SEA Region not only specifically address AMR, but also have an impact on AMR and enforce a functioning system for compliance and enforcement monitoring.



One of key recommendations that resonated with all Member States was to standardize and implement IPC and antimicrobial stewardship programmes nationwide by involving hospital personnel, NGOs and key influencers in the community. To avoid the irrational use and resale of antimicrobials, it was also agreed by all Member States that regulations to monitor pharmacies and online outlets would be necessary.

Furthermore, checking the import of medical products for public and animal health sectors by promoting regulatory cooperation through the South-East Asia Regional Network (SEARN) is more acceptable and innovative and will strengthen AMR containment [3]. These efforts would then drive the agenda of the multisectoral and One Health approach with investments and engagement across sectors to address AMR.

The countries of the SEA Region with large multisectoral working groups were more likely to have made more progress towards several GAP-AMR objectives and NAP-AMR implementation indicators: seven of the 11 countries implemented seven of 16 NAP-AMR indicators at Level C or higher in 2017–2018 and three countries implemented 11 of 16 NAP-AMR indicators at Level C or higher in 2018–2019.

The top four NAP-AMR indicators that have registered high progress in most countries of the SEA Region are raising awareness and understanding of AMR risks and responses, setting up national surveillance systems for AMR, training and/or professional education on AMR in the human health sector, and progress with strengthening veterinary services. On the other hand, the top two NAP-AMR indicators that need further improvement in most countries of the SEA Region include national monitoring systems for antimicrobial use (both in human health and plant production), and training and/or professional education on AMR in non-human sectors.

When they endorsed the 2015 GAP-AMR, all WHO Member States were committed to the ambitious target of developing a multisectoral national action plan within two years. However, the real challenge is not only to ensure that NAPs-AMR are developed but also implemented, funded and supported by a functional monitoring and evaluation system (M&E). Having an M&E system embedded in the AMR containment programme may still be a new concept in many countries. The system was agreed upon and included in most NAPs; however, it remains to be seen how the M&E system will operate. On the other hand, it should be noted that analysis focuses on self-reported data by national government, which might be optimistic on country progress [1,4].

Not only are there limitations on availability and access, but also the capacity to monitor data for antimicrobial use poses challenges for conducting analysis and evaluating country progress each year. To initiate and improve standardized and robust AMR monitoring and surveillance across sectors, it was agreed that WHO and its Global Antimicrobial Resistance Surveillance System (GLASS), and the Tripartite partners must extend support as a matter of priority, providing technical support and guidelines.

Going forward, the momentum that has been generated will be sustained only if there is governance and multisectoral collaboration, including the establishment or availability of platforms that enable joint planning, exchange of surveillance information and co-sharing of resources for AMR initiatives [3]. With better national systems for data collection, database management and advanced method/ software for data analysis, the existing monitoring and surveillance system will be able to not only support monitoring and evaluation of antimicrobial use but also risks for AMR transmission.



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Annexes



Annex 1

Methods

Survey design and distribution

The World Health Assembly has called on the WHO, FAO, OIE and other relevant partners to develop a framework for monitoring and evaluation to assist with the achievement of GAP Principle #5. As part of their response, WHO, OIE and FAO created a national self-assessment survey containing questions structured around the objectives of the GAP. The global monitoring questionnaire and this TrACSS exercise is a component of a broader approach for monitoring and evaluation of the GAP-AMR [1], and specifically addresses monitoring the implementation of the NAP-AMR.

Annual antimicrobial resistance country self-assessment surveys administered by the Tripartite are mentioned in resolution WHA72.5, and the first wave of this survey was sent to all 194 Member States of WHO in late 2016. Three rounds of country progress monitoring using the TrACSS questionnaire have taken place (2016–2017, 2017–2018, 2018–2019) [13–15].

TrACSS was composed of nine broad questions, aimed to evaluate the progress made by countries regarding four GAP-AMR objectives:

- (1) Improve awareness and understanding of antimicrobial resistance through effective communication, education and training;
- (2) Strengthen the knowledge and evidence base through surveillance and research;
- (3) Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures; and
- (4) Optimize the use of antimicrobial medicines in human and animal health.

Questions were structured with responses ranging from A (minimal progress) to E (substantial progress) [1]. It is to be noted that objective 5 of the Global Action Plan, which focuses on investing in development of new tools and building an economic case for addressing AMR, is mainly focused at the global level, and therefore has not been included in the TrACSS questionnaire [13–15].

The TrACSS questionnaire is designed to be completed through self-assessment at country level. The questionnaire was sent to WHO regional offices through which it was shared with the country offices and AMR focal points in the ministries of health. Information emails were also shared by FAO and OIE to their counterparts in the countries to ensure coordination across the sectors. Each country was asked to submit one official response, validated by all sectors involved, which summarizes national progress. Findings were reported to the World Health Assembly and the OIE World Assembly of Delegates. Countries had to submit a response online via a unique link provided per country to avoid multiple responses and versions. All country responses were sent back to the responders for data validation and at this point some countries chose to amend their responses [1,13–15]. Survey database from those three waves are available at <http://www.who.int/antimicrobial-resistance/global-action-plan/database/en/>



Comments from countries on the process, content, and questionnaire have been modified from the previous version to reflect feedback. Changes have primarily sought to decrease ambiguity and additional questions have been added to collect information on indicators as part of the Tripartite Global Monitoring Framework for AMR [13–15]. One significant change is that the second version of the questionnaire more clearly separates responses for different sectors (human health, animal health, plant health, food production, food safety and environment) [1]; as well as distinguishes country coordination with other action plans, strategies or targets related to several important human diseases. Specific questions on country policies and regulations are also included here [13]. The following definitions for every sector had been included:

- *Animal health sector:* In its simplest form, animal health is defined as the absence of disease. This sector includes systems or activities designed to optimize the physical and behavioural health and welfare of animals, including the prevention, treatment and control of diseases and conditions affecting the individual animal and herd or flock. The recording of illness, injuries, mortalities and medical treatments is an essential part of effective animal health measures where appropriate.
- *Plant health sector:* In its simplest form, plant health is defined as the absence of disease. This sector includes phytosanitary systems or measures that focus on preventing, controlling and mitigating the introduction, spread and establishment of diseases or pests of plants.
- *Food production sector:* This sector includes all processes procedures and infrastructure that aim to optimize productivity and efficiency of animal and plant production systems, over and above those relevant to maintain animal/plant health and include aspects such as selective breeding, nutrition, housing systems and other husbandry techniques.
- *Food safety sector:* Aspects of food production and processing which relate to safeguarding public health, whether pre or post slaughter or harvest. Food encompasses any substance, whether processed, semi-processed or raw, which is intended for human consumption.

Non-human health sectors (animal health, plant health, food production, food safety and the environment) were separated in the survey questions, some questions were made more specific, and the bar was raised on some indicators [1]. As such, only a limited number of questions can be compared between 2016–2017, 2017–2018 and 2018–2019. The purpose of this monitoring exercise is to review and summarize regional and country progress in implementing key actions to address AMR, for reporting annually at the global and/or regional level. It is also intended to encourage national-level review of country progress and help identify priorities for next steps. Monitoring data in this report used the TrACSS results for 2016–2017, 2017–2018 and 2018–2019.

Although three surveys followed a similar structure, several changes were made between the 2016–2017, 2017–2018 and 2018–2019 surveys; including changes to the questions, wording of responses, and in some cases changes to the level of the response. As a result, only a few questions were comparable for the three years. Most important of these were on the presence of a multisectoral and One Health collaboration in addressing AMR (4.1); country progress with the development of a national action plan on AMR (5.1); training and professional education in the human health and veterinary sectors (6.2, 6.3, 6.4); progress with strengthening the veterinary services (6.5, 6.6); the presence of a national monitoring system for consumption and rational use of antimicrobials in



human health (7.1); the presence of a national surveillance system for AMR in humans (7.3, 7.4); the presence of a infection prevention and control in human health care (8.1); and progress with optimizing antimicrobial use and antimicrobial stewardship in human health (9.1).

Independent variables

Countries were grouped in the SEA Region as per WHO regional classification. Member States of the WHO SEA Region are Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand and Timor-Leste. Income groups were classified as per World Bank definitions: high-income countries (HIC), upper-middle-income countries (UMIC), lower-middle-income countries (LMIC) and low-income countries (LIC).

Countries with G20 membership include: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Republic of Korea, Russian Federation, Saudi Arabia, South Africa, Turkey, United Kingdom of Great Britain and Northern Ireland, United States of America, and participating countries from the European Union (Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, Luxembourg, Malta, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden). This resulted in 41 G20 members for the purposes of this analysis.

The following variables were incorporated from the World Bank database and were used on the basis of World Bank definitions: GDP (current US\$), GDP per capita (current US\$), and total population (current, n). Variables to capture country-specific governance were incorporated from the World Bank's Worldwide Governance Indicators (WGI) project, which aggregate indicators across six dimensions of governance through the reporting of perceptions provided by many respondents (institutes, think tanks, nongovernmental and international organizations, as well as private sector firms).

These six dimensions include: voice and accountability; political stability; government effectiveness; regulatory quality; rule of law; and control of corruption. The scale used for the estimate of each of these indicators range from -2.5 (weak) to +2.5 (strong) governance performance. Kaufmann et al.'s WGI methodology paper details the underlying data sources used as well as the definition and the interpretation of these indicators [16].

The following variables were incorporated from FAO's database on livestock primary production in 2016: Meat, cattle (item code 867); meat, chicken (item code 1058); and meat, pig (item code 1035). The top 10 producing countries were defined as producing the 10 highest quantities (in tonnes) of cattle, chicken and pig meat from the 154 countries that responded to the survey. The following variable was incorporated from WHO's database: domestic general government health expenditure (2015, as a percentage of GDP) [1].

Countries are asked to identify their progress under each topic in the questionnaire, across relevant sectors. A large multisectoral working group was defined as a group with four or more of any of the following sectors actively involved in developing and implementing the AMR national action plan: human health; animal health; plant health; food production; food safety; and environment.



Most questions ask for a rating of national capacity and progress on a five-point scale (A to E), with some using a 4-point scale (A-D) when less variation is anticipated. Higher ratings are expected to have achieved the progress level covered in lower ratings [13–15]. Some of the analyses required that survey responses be dichotomized: Level C was used as the threshold unless otherwise stated, whereby Levels A and B indicate minimal progress and Levels C, D, and E indicate greater progress. For variables with data from multiple years, the latest available year was included [1].

Analysis

The analysis not only explored the relationship between multisectoral engagement to addressing AMR, a country's progress with its development of a NAP-AMR, the four AMR objectives emphasized by the survey, and a number of variables of interest including government health spending, strengths of industries (chicken, pig, cattle and food and food processing), country population, strength of governance and the presence of large multisectoral working groups [1], but also explained the trends in status of progress at the regional and country level. This will help provide a picture of the stage the country has reached in building an effective and sustainable multisectoral response to AMR.

It may also stimulate discussion at country level on how to increase progress [13–15]. Dummy tables in Microsoft Excel were used for data preparation, data entry and analysis. Descriptive analyses were tabulated for all the survey responses, both in regional progress and country progress level. Data on 11 countries in the SEA Region were also stratified and defined by WHO, World Bank income groups and G20 membership.

A country was defined as being covered by a satisfactory monitoring or surveillance system if their responses indicated they were at Level C or higher. As a result, the global population covered by surveillance or monitoring system was estimated by dividing the combined population of countries at Levels C, D, and E by the global population in related years. While most dichotomized relationships used Level C and higher as a satisfactory threshold, the analysis of the relationship between progress in the development and implementation of a national action plan and the presence of a satisfactory large-scale awareness campaign required that the threshold for the latter be advanced to Level D and E [1].

The questionnaire has been designed to reflect the variations in the stage of implementation across the spectrum of countries responding; some countries, however, may not yet be able to respond to certain questions [13–15]. The total and average number of participating sectors in the development and implementation of national action plans was calculated by assigning one point for each of the sectors involved, both in the human health sector and non-human sectors (i.e. animal health, plant health, food production, food safety, and environment) and performing the corresponding descriptive analyses.

Variables are analysed by classifying data into several topics and explained in Appendix 3 – the map of indicators for monitoring of regional progress on addressing AMR. As part of country progress over the development of a national action plan on antimicrobial resistance (AMR), data related to country policies and regulations on antimicrobial use (5.4, 2018–2019) are also used to support country progress on Strategic Objective 4: Optimize the use analysis of antimicrobial medicines in human, animal and plant health.



An implementation score for 2016–2017, 2017–2018 and 2018–2019 was calculated for those countries that scored at least a Level B on indicator 4.1 (multisectoral working group) and 5.1 (national action plan development). If 2017–2018 used as baseline, this is the following indicator code for 2016–2017, 2017–2018 and 2018–2019 that had been included:

- Indicators 6.1, 6.3 (6.2 in 2018–2019), 7.1, 7.4 (7.3 in 2016–2017), 8.1, and 9.1 were considered human-sector indicators,
- Indicators 6.2 (only highest value for 6.2.1 in 2017–2018 and for 6.1.1 in 2018–2019), 6.4 (6.3 in 2018–2019), 6.5 (6.4 in 2018–2019), 6.6 (6.5 in 2016–2017 and 2018–2019), 7.2, 7.3 (7.2 in 2016–2017), 7.5 (7.4 in 2016–2017, 7.5 and 7.5.1 in 2017–2018), 8.2 (8.2 and 8.3 in 2018–2019; 8.2 and 8.2.1 in 2017–2018), 9.2 (only highest value for 9.2.1 in 2017–2018), and 9.3 were considered non-human indicators.

Countries were considered as having achieved “implementation” if they scored a Level C or higher on these indicators, resulting in scores from 0 (i.e., no implementation) to 16 (i.e., full implementation) by adding the number of indicators for which the scoring threshold (level 3) was achieved [1].



Annex 2

Country profiles

Bangladesh

Table 4: Country profile on addressing AMR in Bangladesh
(2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	C	D
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV		No	No
A.2.2	Tuberculosis		No	No
A.2.3	Malaria		Yes	Yes
A.2.3	Neglected tropical diseases		Yes	Yes
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	B	B	B
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		No	Yes
B.2.3	Food production		No	No
B.2.4	Food safety		No	No
B.2.5	Plant health		No	No
B.2.6	Environment		No	No
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			C
C.1.2	Human health	B	C	
C.1.3	Animal health and food production	B		
C.1.4	Animal health			
C.1.5	Food production			
C.1.6	Food safety			
C.1.7	Plant health			
C.1.8	Environment			



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			C
C.2.3	Food production			A
C.2.4	Food safety			A
C.2.5	Plant health			A
C.2.6	Environment			A
C.3	AMR training and professional education			
C.3.1	Human health	B	B	C
C.3.2	Veterinary	B	B	B
C.3.3	Farming sector (animal and plant), food production Food safety and environment		B	
C.4	Strengthening veterinary services	B	C	C
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	A	B	B
D.1.2	Animal health and crop production	A		
D.1.3	Animal health		B	C
D.1.4	Plant production			A
D.2	National surveillance system for AMR			
D.2.1	Human sector	A	C	D
D.2.2	Animal and food	A		
D.2.3	Animal			D
D.2.4	Food			B
D.2.5	Plant			
D.2.6	Environment			
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			Yes
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			C
D.4.2	Relevance of diagnostic techniques			B
D.4.3	Standardization and harmonization of procedures			A
D.4.4	Data management			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.	Reducing the incidence of infection			
E.1	IPC in human health care	B	B	B
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	A		
E.2.2	Animal, plant and food production		B	
E.2.3	Animal health			
E.2.4	Animal production			C
E.2.5	Food production			
E.2.6	Food processing			
E.2.7	Food safety			
E.2.8	Plant health			
E.2.9	Environment			
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine	100% (based on data from 2017)		
E.3.2	Coverage of HiB vaccine	100% (based on data from 2017)		
E.3.3	Basic water supplies in facilities	100% (based on data from 2017)		
E.3.4	Basic hand hygiene facilities	100% (based on data from 2017)		
E.3.5	Functional sanitation facilities	100% (based on data from 2017)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		Yes	
F.1.3	Growth promotion		No	Yes
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	A	B	A
F.2.2	Animal and crop production	A		
F.2.3	Animal health			C
F.2.4	Plant health			
G.	Overall implementation progress			
G.1	Total of implemented indicator	0 of 16	4 of 16	9 of 16
G.2	Indicator code		1, 4, 10, 15	1, 2, 4, 7, 10, 11, 13, 14, 15



Bhutan

Table 5: Country profile on addressing AMR in Bhutan (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	D	D
A.2	NAP-AMR Linked to existing action plan of:			
A.2.1	HIV			No
A.2.2	Tuberculosis			No
A.2.3	Malaria			No
A.2.3	Neglected Tropical Diseases			No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health Collaboration	B	B	B
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		Yes	No
B.2.4	Food safety		Yes	Yes
B.2.5	Plant health		No	No
B.2.6	Environment		No	No
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			C
C.1.2	Human health	B	C	
C.1.3	Animal health and food production	B		
C.1.4	Animal health		C	
C.1.5	Food production		B	
C.1.6	Food safety		B	
C.1.7	Plant health		A	
C.1.8	Environment		A	
C.2	The extent of Multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			B
C.2.3	Food production			B
C.2.4	Food safety			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.5	Plant health			B
C.2.6	Environment			A
C.3	AMR training and professional education			
C.3.1	Human health	B	A	B
C.3.2	Veterinary	A	A	C
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		A	A
C.4	Strengthening veterinary services	B	B	B
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	C	B	C
D.1.2	Animal health and crop production	E		
D.1.3	Animal health		B	C
D.1.4	Plant production		A	A
D.2	National surveillance system for AMR			
D.2.1	Human sector	B	C	B
D.2.2	Animal and food	A		
D.2.3	Animal		B	C
D.2.4	Food		B	C
D.2.5	Plant		B	
D.2.6	Environment		B	
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			C
D.4.2	Relevance of diagnostic techniques			D
D.4.3	Standardization and harmonization of procedures			B
D.4.4	Data management			B
E.	Reducing the incidence of infection			
E.1	IPC in human health care	C	B	B
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	B		



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.2	Animal, plant, and food production		B	
E.2.3	Animal health		B	
E.2.4	Animal production			B
E.2.5	Food production		B	
E.2.6	Food processing			C
E.2.7	Food safety		B	
E.2.8	Plant health		B	
E.2.9	Environment		B	
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine	94.4% (based on data from 2016)		
E.3.2	Coverage of Hib vaccine			
E.3.3	Basic water supplies in facility	95% (based on data from 2016)		
E.3.4	Basic hand hygiene facilities	66.3% (based on data from 2016)		
E.3.5	Functional sanitation facilities			
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		Yes	
F.1.3	Growth promotion		Yes	Yes
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	C	B	C
F.2.2	Animal and crop production	A		
F.2.3	Animal health		B	B
F.2.4	Plant health		B	
G.	Overall implementation progress			
G.1	Total of implemented indicator	5 of 16	3 of 16	7 of 16
G.2	Indicator code	3, 5, 6, 11, 12	1, 4, 7	1, 3, 6, 8, 11, 13, 14



Democratic People's Republic of Korea

Table 6: Country profile on addressing AMR in the Democratic People's Republic of Korea (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	A	C	C
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV		No	No
A.2.2	Tuberculosis		Yes	Yes
A.2.3	Malaria		Yes	Yes
A.2.3	Neglected tropical diseases		No	No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	B	B	B
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		No	No
B.2.4	Food safety		No	No
B.2.5	Plant health		No	No
B.2.6	Environment		No	No
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			C
C.1.2	Human health	B	C	
C.1.3	Animal health and food production	A		
C.1.4	Animal health		C	
C.1.5	Food production			
C.1.6	Food safety			
C.1.7	Plant health			
C.1.8	Environment			
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.3	Food production			A
C.2.4	Food safety			A
C.2.5	Plant health			A
C.2.6	Environment			A
C.3	AMR training and professional education			
C.3.1	Human health	D	B	B
C.3.2	Veterinary	B	B	B
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		B	B
C.4	Strengthening veterinary services		C	C
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	B	A	B
D.1.2	Animal health and crop production	B		
D.1.3	Animal health		B	
D.1.4	Plant production		A	A
D.2	National surveillance system for AMR			
D.2.1	Human sector	B	B	B
D.2.2	Animal and food			
D.2.3	Animal		B	B
D.2.4	Food			
D.2.5	Plant			
D.2.6	Environment			
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			A
D.4.2	Relevance of diagnostic techniques			A
D.4.3	Standardization and harmonization of procedures			A
D.4.4	Data management			A



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.	Reducing the incidence of infection			
E.1	IPC in human health care	A	D	C
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production			
E.2.2	Animal, plant, and food production		C	
E.2.3	Animal health		C	
E.2.4	Animal production			B
E.2.5	Food production			
E.2.6	Food processing			B
E.2.7	Food safety			
E.2.8	Plant health			
E.2.9	Environment			
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine			
E.3.2	Coverage of HiB vaccine			
E.3.3	Basic water supplies in facility	100% (based on data from 2017)		
E.3.4	Basic hand hygiene facilities	100% (based on data from 2017)		
E.3.5	Functional sanitation facilities	100% (based on data from 2017)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		No	Yes
F.1.2	Animal use		No	
F.1.3	Growth promotion		Yes	No
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	C	B	B
F.2.2	Animal and crop production			
F.2.3	Animal health		C	C
F.2.4	Plant health			
G.	Overall implementation progress			
G.1	Total of implemented indicator	3 of 16	7 of 16	4 of 16
G.2	Indicator code	2, 6, 16	1, 5, 7, 10, 14, 15, 16	1, 5, 10, 15



India

Table 7: Country profile on addressing AMR in India (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	D	D
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV			Yes
A.2.2	Tuberculosis			Yes
A.2.3	Malaria			Yes
A.2.3	Neglected tropical diseases			Yes
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	C	C	C
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		No	No
B.2.4	Food safety		Yes	Yes
B.2.5	Plant health		No	No
B.2.6	Environment		Yes	Yes
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			C
C.1.2	Human health	C	C	
C.1.3	Animal health and food production	B		
C.1.4	Animal health		C	
C.1.5	Food production			
C.1.6	Food safety		C	
C.1.7	Plant health			
C.1.8	Environment		C	
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			B
C.2.3	Food production			B
C.2.4	Food safety			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.5	Plant health			A
C.2.6	Environment			B
C.3	AMR training and professional education			
C.3.1	Human health	C	C	C
C.3.2	Veterinary	B	D	D
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		A	B
C.4	Strengthening veterinary services	C	B	B
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	C	A	B
D.1.2	Animal health and crop production	A		
D.1.3	Animal health		A	A
D.1.4	Plant production		A	A
D.2	National surveillance system for AMR			
D.2.1	Human sector	C	D	D
D.2.2	Animal and food	B		
D.2.3	Animal		C	C
D.2.4	Food		C	C
D.2.5	Plant			
D.2.6	Environment		B	
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			C
D.4.2	Relevance of diagnostic techniques			C
D.4.3	Standardization and harmonization of procedures			C
D.4.4	Data management			C
E.	Reducing the incidence of infection			
E.1	IPC in human health care	C	C	B
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	B		
E.2.2	Animal, plant, and food production		C	



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.3	Animal health		C	
E.2.4	Animal production			B
E.2.5	Food production			
E.2.6	Food processing			B
E.2.7	Food safety		B	
E.2.8	Plant health			
E.2.9	Environment		B	
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine			
E.3.2	Coverage of HiB vaccine	83% (based on data from 2017)		
E.3.3	Basic water supplies in facility			
E.3.4	Basic hand hygiene facilities			
E.3.5	Functional sanitation facilities			
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		No	
F.1.3	Growth promotion		No	No
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	C	C	C
F.2.2	Animal and crop production	C		
F.2.3	Animal health		B	B
F.2.4	Plant health			
G.	Overall implementation progress			
G.1	Total of implemented indicator	9 of 16	10 of 16	6 of 16
G.2	Indicator code	1, 2, 3, 4, 5, 6, 10, 15, 16	1, 2, 4, 5, 6, 7, 8, 13, 14, 16	1, 2, 4, 6, 8, 13



Indonesia

Table 8: Country profile on addressing AMR in Indonesia (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	D	D
A.2	NAP-AMR linked to existing Action Plan of:			
A.2.1	HIV			No
A.2.2	Tuberculosis			No
A.2.3	Malaria			No
A.2.3	Neglected tropical diseases			No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	B	A	A
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		No	Yes
B.2.4	Food safety		No	Yes
B.2.5	Plant health		No	No
B.2.6	Environment		No	No
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			D
C.1.2	Human health	D	D	
C.1.3	Animal health and food production	B		
C.1.4	Animal health		B	
C.1.5	Food production		B	
C.1.6	Food safety		C	
C.1.7	Plant health		A	
C.1.8	Environment			
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			B
C.2.3	Food production			B
C.2.4	Food safety			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.5	Plant health			A
C.2.6	Environment			A
C.3	AMR training and professional education			
C.3.1	Human health	C	B	B
C.3.2	Veterinary	B	B	B
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		A	B
C.4	Strengthening veterinary services	C	B	C
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	A	B	B
D.1.2	Animal health and crop production	A		
D.1.3	Animal health		B	C
D.1.4	Plant production		A	A
D.2	National surveillance system for AMR			
D.2.1	Human sector	B	B	B
D.2.2	Animal and food	B		
D.2.3	Animal		D	D
D.2.4	Food		D	D
D.2.5	Plant		A	
D.2.6	Environment			
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			C
D.4.2	Relevance of diagnostic techniques			D
D.4.3	Standardization and harmonization of procedures			C
D.4.4	Data management			C
E.	Reducing the Incidence of infection			
E.1	IPC in human health care	D	C	C
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	B		
E.2.2	Animal, plant, and food production			



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.3	Animal health		C	
E.2.4	Animal production			C
E.2.5	Food production		C	
E.2.6	Food processing			D
E.2.7	Food safety		C	
E.2.8	Plant health		B	
E.2.9	Environment			
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine			
E.3.2	Coverage of HiB vaccine	87.7% (based on data from 2017)		
E.3.3	Basic water supplies in facility	73.4% (based on data from 2011)		
E.3.4	Basic hand hygiene facilities			
E.3.5	Functional sanitation facilities			
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		Yes	
F.1.3	Growth promotion		Yes	Yes
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	C	D	D
F.2.2	Animal and crop production	C		
F.2.3	Animal health		D	E
F.2.4	Plant health		B	
G.	Overall implementation progress			
G.1	Total of implemented indicator	6 of 16	7 of 16	8 of 16
G.2	Indicator code	1, 2, 5, 6, 10, 15	1, 5, 6, 7, 13, 14, 15	1, 5, 6, 10, 11, 13, 14, 15



Maldives

Table 9: Country profile on addressing AMR in Maldives (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	D	D
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV		Yes	Yes
A.2.2	Tuberculosis		Yes	Yes
A.2.3	Malaria		No	No
A.2.3	Neglected tropical diseases		No	No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	B	C	C
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		Yes	Yes
B.2.4	Food safety		Yes	Yes
B.2.5	Plant health		Yes	Yes
B.2.6	Environment		Yes	Yes
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			D
C.1.2	Human health	B	D	
C.1.3	Animal health and food production	B		
C.1.4	Animal health		E	
C.1.5	Food production		C	
C.1.6	Food safety		C	
C.1.7	Plant health		A	
C.1.8	Environment		A	
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			B
C.2.3	Food production			A
C.2.4	Food safety			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.5	Plant health			B
C.2.6	Environment			B
C.3	AMR training and professional education			
C.3.1	Human health	A	C	C
C.3.2	Veterinary	A	A	A
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		B	A
C.4	Strengthening veterinary services	A	A	A
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	B	D	D
D.1.2	Animal health and crop production	A		
D.1.3	Animal health		B	B
D.1.4	Plant production		A	A
D.2	National surveillance system for AMR			
D.2.1	Human sector	B	C	C
D.2.2	Animal and food	A		
D.2.3	Animal		A	C
D.2.4	Food		C	C
D.2.5	Plant		A	
D.2.6	Environment		B	
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			A
D.4.2	Relevance of diagnostic techniques			A
D.4.3	Standardization and harmonization of procedures			A
D.4.4	Data management			A
E.	Reducing the incidence of infection			
E.1	IPC in human health care	B	B	B
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	A		
E.2.2	Animal, plant, and food production		B	



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.3	Animal health		B	
E.2.4	Animal production			B
E.2.5	Food production		B	
E.2.6	Food processing			B
E.2.7	Food safety		B	
E.2.8	Plant health		B	
E.2.9	Environment		A	
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine			
E.3.2	Coverage of HiB vaccine	99.5% (based on data from 2016)		
E.3.3	Basic water supplies in facility	100% (based on data from 2017)		
E.3.4	Basic hand hygiene facilities	100% (based on data from 2017)		
E.3.5	Functional sanitation facilities	100% (based on data from 2017)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		No	
F.1.3	Growth promotion		No	No
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	A	D	D
F.2.2	Animal and crop production	A		
F.2.3	Animal health		A	A
F.2.4	Plant health		A	
G.	Overall implementation progress			
G.1	Total of implemented indicator	0 of 16	7 of 16	6 of 16
G.2	Indicator code		1, 2, 3, 4, 6, 7, 13	1, 2, 3, 4, 6, 13



Myanmar

Table 10: Country profile on addressing AMR in Myanmar (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	D	D
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV		Yes	Yes
A.2.2	Tuberculosis		Yes	Yes
A.2.3	Malaria		Yes	Yes
A.2.3	Neglected tropical diseases		No	No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	A	B	D
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		Yes	Yes
B.2.4	Food safety		Yes	Yes
B.2.5	Plant health		Yes	Yes
B.2.6	Environment		Yes	Yes
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			D
C.1.2	Human health	A	C	
C.1.3	Animal health and food production	B		
C.1.4	Animal health		C	
C.1.5	Food production		B	
C.1.6	Food safety		A	
C.1.7	Plant health		B	
C.1.8	Environment		A	
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			C
C.2.3	Food production			B
C.2.4	Food safety			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.5	Plant health			B
C.2.6	Environment			B
C.3	AMR training and professional education			
C.3.1	Human health	B	C	C
C.3.2	Veterinary	A	B	C
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		B	B
C.4	Strengthening veterinary services	D	D	D
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	A	A	A
D.1.2	Animal health and crop production	A		
D.1.3	Animal health		B	C
D.1.4	Plant production		B	C
D.2	National surveillance system for AMR			
D.2.1	Human sector	B	C	D
D.2.2	Animal and food	B		
D.2.3	Animal		C	C
D.2.4	Food		A	B
D.2.5	Plant		A	
D.2.6	Environment		A	
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			B
D.4.2	Relevance of diagnostic techniques			B
D.4.3	Standardization and harmonization of procedures			A
D.4.4	Data management			B
E.	Reducing the incidence of infection			
E.1	IPC in human health care	C	C	C
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	B		



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.2	Animal, plant, and food production			
E.2.3	Animal health		C	
E.2.4	Animal production			B
E.2.5	Food production		C	
E.2.6	Food processing			B
E.2.7	Food safety		D	
E.2.8	Plant health		C	
E.2.9	Environment		B	
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine	81% (based on data from 2017)		
E.3.2	Coverage of HiB vaccine	93% (based on data from 2017)		
E.3.3	Basic water supplies in facility	94% (based on data from 2017)		
E.3.4	Basic hand hygiene facilities	33% (based on data from 2017)		
E.3.5	Functional sanitation facilities	67% (based on data from 2017)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		No	
F.1.3	Growth promotion		No	Yes
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	A	B	C
F.2.2	Animal and crop production	A		
F.2.3	Animal health		B	B
F.2.4	Plant health		B	
G.	Overall implementation progress			
G.1	Total of implemented indicator	2 of 16	9 of 16	11 of 16
G.2	Indicator code	5, 10	1, 2, 4, 5, 7, 10, 13, 14, 16	1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13



Nepal

Table 11: Country profile on addressing AMR in Nepal (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	C	C
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV		No	No
A.2.2	Tuberculosis		No	No
A.2.3	Malaria		No	No
A.2.3	Neglected tropical diseases		No	No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	B	B	C
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		No	No
B.2.4	Food safety		No	No
B.2.5	Plant health		No	No
B.2.6	Environment		No	No
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			C
C.1.2	Human health	B	C	
C.1.3	Animal health and food production	B		
C.1.4	Animal health			
C.1.5	Food production			
C.1.6	Food safety			
C.1.7	Plant health			
C.1.8	Environment			
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			B
C.2.2	Animal health			B
C.2.3	Food production			B
C.2.4	Food safety			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.5	Plant health			A
C.2.6	Environment			B
C.3	AMR training and professional education			
C.3.1	Human health	B	C	C
C.3.2	Veterinary	B	C	C
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		A	C
C.4	Strengthening veterinary services	B	B	B
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	A	A	A
D.1.2	Animal health and crop production	A		
D.1.3	Animal health		A	
D.1.4	Plant production		A	
D.2	National surveillance system for AMR			
D.2.1	Human sector	C	C	D
D.2.2	Animal and food	B		
D.2.3	Animal			C
D.2.4	Food			
D.2.5	Plant			
D.2.6	Environment			
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			C
D.4.2	Relevance of diagnostic techniques			B
D.4.3	Standardization and harmonization of procedures			B
D.4.4	Data management			B
E.	Reducing the incidence of infection			
E.1	IPC in human health care	C	A	A
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	A		
E.2.2	Animal, plant, and food production		B	



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.3	Animal health			
E.2.4	Animal production			B
E.2.5	Food production			
E.2.6	Food processing			B
E.2.7	Food safety			
E.2.8	Plant health			
E.2.9	Environment			
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine	80% (based on data from 2017)		
E.3.2	Coverage of HiB vaccine	80% (based on data from 2017)		
E.3.3	Basic water supplies in facility	80% (based on data from 2017)		
E.3.4	Basic hand hygiene facilities	80% (based on data from 2017)		
E.3.5	Functional sanitation facilities	80% (based on data from 2017)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		No	Yes
F.1.2	Animal use		No	
F.1.3	Growth promotion		Yes	Yes
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	A	B	B
F.2.2	Animal and crop production	A		
F.2.3	Animal health			B
F.2.4	Plant health			
G.	Overall implementation progress			
G.1	Total of implemented indicator	3 of 16	6 of 16	5 of 16
G.2	Indicator code	4, 5	1, 2, 4, 7, 8, 13	2, 4, 8, 9, 13, 16



Sri Lanka

Table 12: Country profile on addressing AMR in Sri Lanka (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	D	E
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV			No
A.2.2	Tuberculosis			No
A.2.3	Malaria			No
A.2.3	Neglected tropical diseases			No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	C	E	E
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		No	No
B.2.4	Food safety		No	No
B.2.5	Plant health		Yes	Yes
B.2.6	Environment		No	Yes
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			E
C.1.2	Human health	B	D	
C.1.3	Animal health and food production	B		
C.1.4	Animal health		E	
C.1.5	Food production			
C.1.6	Food safety			
C.1.7	Plant health		B	
C.1.8	Environment			
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			C
C.2.3	Food production			A
C.2.4	Food safety			A



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.5	Plant health			B
C.2.6	Environment			B
C.3	AMR training and professional education			
C.3.1	Human health	C	C	C
C.3.2	Veterinary		E	D
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		B	B
C.4	Strengthening veterinary services		B	C
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	B	B	B
D.1.2	Animal health and crop production			
D.1.3	Animal health		C	C
D.1.4	Plant production		A	C
D.2	National surveillance system for AMR			
D.2.1	Human sector	D	D	D
D.2.2	Animal and food			
D.2.3	Animal		B	C
D.2.4	Food			D
D.2.5	Plant		A	
D.2.6	Environment			
D.3	National AMR strategy data reviews			
D.3.1	Human health			Yes
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			C
D.4.2	Relevance of diagnostic techniques			D
D.4.3	Standardization and harmonization of procedures			A
D.4.4	Data management			C
E.	Reducing the incidence of infection			
E.1	IPC in human health care	C	B	C
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production			
E.2.2	Animal, plant, and food production			



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.3	Animal health		C	
E.2.4	Animal production			B
E.2.5	Food production			
E.2.6	Food processing			B
E.2.7	Food safety			
E.2.8	Plant health		B	
E.2.9	Environment			
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine			
E.3.2	Coverage of HiB vaccine	99% (based on data from 2017)		
E.3.3	Basic water supplies in facility	100% (based on data 2017)		
E.3.4	Basic hand hygiene facilities	100% (based on data 2017)		
E.3.5	Functional sanitation facilities	100% (based on data 2017)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		Yes	
F.1.3	Growth promotion		No	Yes
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	A	A	C
F.2.2	Animal and crop production			
F.2.3	Animal health		B	B
F.2.4	Plant health		A	
G.	Overall implementation progress			
G.1	Total of implemented indicator	4 of 16	7 of 16	11 of 16
G.2	Indicator code	2, 4, 5, 16	1, 2, 4, 7, 8, 11, 14	1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13



Thailand

Table 13: Country profile on addressing AMR in Thailand (2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	E	E
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV			No
A.2.2	Tuberculosis			No
A.2.3	Malaria			No
A.2.3	Neglected tropical diseases			No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	B	E	E
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		Yes	Yes
B.2.4	Food safety		Yes	Yes
B.2.5	Plant health		Yes	Yes
B.2.6	Environment		Yes	Yes
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			D
C.1.2	Human health	B	E	
C.1.3	Animal health and food production	B		
C.1.4	Animal health		D	
C.1.5	Food production		C	
C.1.6	Food safety		C	
C.1.7	Plant health		B	
C.1.8	Environment		B	
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			B



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.3	Food production			B
C.2.4	Food safety			B
C.2.5	Plant health			B
C.2.6	Environment			B
C.3	AMR training and professional education			
C.3.1	Human health	D	D	
C.3.2	Veterinary	B	D	D
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		B	C
C.4	Strengthening veterinary services	C	D	D
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	B	B	C
D.1.2	Animal health and crop production	B		
D.1.3	Animal health		B	C
D.1.4	Plant production		C	B
D.2	National surveillance system for AMR			
D.2.1	Human sector	D	C	D
D.2.2	Animal and food	B		
D.2.3	Animal		C	C
D.2.4	Food		C	C
D.2.5	Plant		B	
D.2.6	Environment		B	
D.3	National AMR strategy data reviews			
D.3.1	Human health			Yes
D.3.2	Animal health			Yes
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			C
D.4.2	Relevance of diagnostic techniques			D
D.4.3	Standardization and harmonization of procedures			D
D.4.4	Data management			C



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.	Reducing the incidence of infection			
E.1	IPC in human health care	C	D	B
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	C		
E.2.2	Animal, plant, and food production			
E.2.3	Animal health		D	
E.2.4	Animal production			D
E.2.5	Food production		D	
E.2.6	Food processing			D
E.2.7	Food safety		D	
E.2.8	Plant health		B	
E.2.9	Environment			
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine			
E.3.2	Coverage of HiB vaccine			
E.3.3	Basic water supplies in facility	100% (based on data from 2017)		
E.3.4	Basic hand hygiene facilities	100% (based on data from 2017)		
E.3.5	Functional sanitation facilities	100% (based on data from 2017)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		Yes	
F.1.3	Growth promotion		Yes	Yes
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	B	C	D
F.2.2	Animal and crop production	C		
F.2.3	Animal health		C	C
F.2.4	Plant health		B	
G.	Overall implementation progress			
G.1	Total of implemented indicator	6 of 16	13 of 16	11 of 16
G.2	Indicator code	2, 4, 5, 10, 14, 15	1, 2, 4, 5, 6, 7, 8, 10, 12, 13, 14, 15, 16	1, 3, 4, 6, 8, 9, 10, 11, 13, 14, 15



Timor-Leste

Table 14: Country profile on addressing AMR in Timor-Leste
(2016–2017, 2017–2018, 2018–2019)

No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
A.	Progress on AMR National Action Plan			
A.1	Development of National Action Plan on AMR	C	C	D
A.2	NAP-AMR linked to existing action plan of:			
A.2.1	HIV		No	No
A.2.2	Tuberculosis		No	No
A.2.3	Malaria		No	No
A.2.3	Neglected tropical diseases		No	No
B.	Multisectoral approaches to addressing AMR			
B.1	Multisectoral and One Health collaboration	B	B	B
B.2	Multisectoral involvement in NAP-AMR			
B.2.1	Human health		Yes	Yes
B.2.2	Animal health		Yes	Yes
B.2.3	Food production		No	No
B.2.4	Food safety		No	No
B.2.5	Plant health		No	No
B.2.6	Environment		No	Yes
C.	Improving awareness and understanding of AMR			
C.1	Awareness and understanding of AMR			
C.1.1	Overall			D
C.1.2	Human health	D	D	
C.1.3	Animal health and food production	A		
C.1.4	Animal health		A	
C.1.5	Food production		A	
C.1.6	Food safety		A	
C.1.7	Plant health		A	
C.1.8	Environment		A	
C.2	The extent of multisectoral involvement			
C.2.1	Human sector			C
C.2.2	Animal health			B
C.2.3	Food production			A



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
C.2.4	Food safety			A
C.2.5	Plant health			A
C.2.6	Environment			B
C.3	AMR training and professional education			
C.3.1	Human health	A	A	B
C.3.2	Veterinary	A	A	B
C.3.3	Farming sector (animal and plant), food production, Food safety and environment		A	A
C.4	Strengthening veterinary services	B	B	B
D.	Strengthening the knowledge and evidence base			
D.1	National monitoring for antimicrobial use			
D.1.1	Human sector	B	B	C
D.1.2	Animal health and crop production	D		
D.1.3	Animal health		C	C
D.1.4	Plant production		A	A
D.2	National surveillance system for AMR			
D.2.1	Human sector	A	A	B
D.2.2	Animal and food	A		
D.2.3	Animal		B	A
D.2.4	Food		A	A
D.2.5	Plant		A	
D.2.6	Environment		A	
D.3	National AMR strategy data reviews			
D.3.1	Human health			No
D.3.2	Animal health			No
D.4	Laboratory network in AMR surveillance system			
D.4.1	Laboratory integration			A
D.4.2	Relevance of diagnostic techniques			A
D.4.3	Standardization and harmonization of procedures			A
D.4.4	Data management			A
E.	Reducing the incidence of infection			
E.1	IPC in human health care	B	C	B
E.2	Good health, management and hygiene practices			
E.2.1	Animal and food production	A		



No.	Indicator for country progress on AMR	2016–2017	2017–2018	2018–2019
E.2.2	Animal, plant, and food production		A	
E.2.3	Animal health		A	
E.2.4	Animal production			A
E.2.5	Food production		A	
E.2.6	Food processing			A
E.2.7	Food safety		A	
E.2.8	Plant health		A	
E.2.9	Environment		A	
E.3	National coverage with critical measurement			
E.3.1	Coverage of pneumococcus vaccine			
E.3.2	Coverage of HiB vaccine	86% (based on data from 2016)		
E.3.3	Basic water supplies in facility	85% (based on data from 2016)		
E.3.4	Basic hand hygiene facilities	60% (based on data from 2016)		
E.3.5	Functional sanitation facilities	80% (based on data from 2016)		
F.	Optimizing the use of antimicrobial medicines			
F.1	Country policies for antimicrobial use			
F.1.1	Human sector		Yes	Yes
F.1.2	Animal use		No	
F.1.3	Growth promotion		No	No
F.2	Antimicrobial use and antimicrobial stewardship			
F.2.1	Human sector	A	A	D
F.2.2	Animal and crop production	A		
F.2.3	Animal health		A	A
F.2.4	Plant health		A	
G.	Overall implementation progress			
G.1	Total of implemented indicator	3 of 16	3 of 16	4 of 16
G.2	Indicator code	1, 11, 12	1, 5, 11	1, 3, 6, 11

A.1 Development of national action plans on AMR

A = No national AMR action plan.

B = National AMR action plan under development.

C = National AMR action plan developed.

D = National AMR action plan approved by government that reflects Global Action Plan objectives, with an operational plan and monitoring arrangements.

E = National AMR action plan has funding sources identified, is being implemented and has relevant sectors involved with a defined monitoring and evaluation process in place.



B.1 Multisectoral and One Health collaboration

- A = No formal multisectoral governance or coordination mechanism on AMR exists.
- B = Multisectoral working group(s) or coordination committee on AMR established with Government leadership.
- C = Multisectoral working group(s) is (are) functional, with clear terms of reference; regular meetings, and funding for working group(s). Activities and reporting/accountability arrangements are defined.
- D = Joint working on issues including agreement on common objectives.
- E = Integrated approaches used to implement the national AMR action plan with relevant data and lessons learned from all sectors used to adapt implementation of the action plan.

C.1 Awareness and understanding of AMR

C.1.1 Overall

- A = No significant awareness-raising activities on relevant aspects of risks of antimicrobial resistance.
- B = Some activities in parts of the country to raise awareness about risks of antimicrobial resistance and actions that can be taken to address it.
- C = Limited or small-scale antimicrobial resistance awareness campaign targeting some but not all relevant stakeholders.
- D = Nationwide, government-supported antimicrobial resistance awareness campaign targeting all or the majority of relevant stakeholders, based on stakeholder analysis, utilizing targeted messaging accordingly within sectors.
- E = Targeted, nationwide government-supported activities implemented to change behavior of key stakeholders within sectors, with monitoring undertaken over the last 2–5 years.

C.1.2 Human health

- A = No significant awareness-raising activities on antibiotic resistance.
- B = Some activities in parts of the country to raise awareness about risks of antibiotic resistance and actions that can be taken to address it.
- C = Limited or small-scale antibiotic resistance awareness campaign targeting some, but not all, relevant stakeholders (e.g. general public, doctors, pharmacists, nurses, medicine sellers).
- D = Nationwide, government-supported antibiotic awareness campaign targeting all or the majority of stakeholders.
- E = Focused, national scale government-supported activities implemented to change behavior regarding antibiotic resistance in target groups in human health, both public and private sectors, with monitoring undertaken of their awareness and behavior change over last 5 years.

C.1.3-C.1.8 Animal health, food production, food safety, plant health and environment

2016–2017

- A = No significant awareness-raising activities on risks of antibiotic resistance for animal health and risks of transmission of resistant pathogens through the food chain
- B = Some activities in parts of the country to raise awareness about antimicrobial resistance and actions to address it.
- C = Nationwide, antimicrobial awareness campaign targeting food producers and farmers, with government involvement.
- D = Nationwide, government-supported antimicrobial awareness campaign targeting specific groups (e.g. veterinarians, veterinary para-professionals, farmers, pharmaceutical agents,).
- E = Focused, national scale activities to change behavior in target groups in animal health, animal husbandry and in the food chain, in both public and private sectors. Monitoring of awareness and behavior change in last 5 years.

2017–2018

- A = No significant awareness-raising activities on relevant aspects of risks of antimicrobial resistance.
- B = Some activities in parts of the country to raise awareness about risks of antimicrobial resistance and actions that can be taken to address it.
- C = Limited or small-scale antimicrobial resistance awareness campaign targeting some but not all relevant stakeholders within sector.
- D = Nationwide, government-supported antimicrobial resistance awareness campaign targeting all or the majority of relevant stakeholders within sector.
- E = Focused, national scale government supported activities implemented to change behavior of relevant stakeholders within sector, with monitoring undertaken of their awareness and behavior change over last 2–5 years.



C.2 The extent of multisectoral involvement (C.2.1 – C.2.6)

- A = This sector not involved
- B = Some activities done in this sector
- C = This sector is a focus for activities

C.3 AMR training and professional education

C.3.1 Human health

- A = No training for human health workers on AMR.
- B = Ad hoc AMR training courses in some human health related disciplines.
- C = AMR is covered in 1) some pre-service training and in 2) some in-service training or other continuing professional development (CPD) for human health workers.
- D = AMR is covered in pre-service training for all relevant cadres. In-service training or other CPD covering AMR is available for all types of human health workers nationwide.
- E = AMR is systematically and formally incorporated in pre-service training curricula for all relevant human health cadres. In-service training or other CPD on AMR is taken up by relevant groups for human health nationwide, in public and private sectors.

C.3.2 Veterinary

2016–2017

- A = No training of veterinary workforce on AMR.
- B = Ad hoc training courses on AMR available.
- C = Regular participation in training opportunities on AMR.
- D = Training opportunities are available nationwide for public and private sector veterinarians, veterinary para-professionals and animal health workforce on mechanisms leading to AMR, regulations and best practices for antimicrobial use.
- E = AMR incorporated in core veterinary education and CPD for veterinarians, veterinary para-professionals and others involved in animal health and agriculture.

2017–2018, 2018–2019

- A = No training of veterinary related professionals (veterinarians and veterinary paraprofessionals) related to AMR.
- B = Ad hoc AMR training courses available for veterinary related professionals.
- C = AMR and appropriate use is covered in core curricula for graduating veterinarians and for veterinary paraprofessionals when relevant.
- D = Continuing professional training on antimicrobial resistance and antimicrobial use is available nationwide for veterinary related professionals.
- E = AMR is systematically and formally incorporated in curricula for graduating veterinarians and veterinary paraprofessionals when relevant and continuing professional training is a formal requirement.

C.3.3 Farming sector (animal and plant), food production, food safety and environment

- A = No training provision on AMR for key stakeholders, e.g. farmers and farm workers, extension workers, food and feed processors and retailers, environmental specialists.
- B = Tailored ad hoc AMR training courses available for at least two groups of key stakeholders.
- C = Tailored ad hoc AMR training courses are available for all or the majority of key stakeholders.
- D = Tailored AMR training courses are routinely available nationwide for all key stakeholders and completion of training is a formal requirement for at least two groups of key stakeholders.
- E = Tailored AMR training courses are routinely available nationwide and completion of training is a formal requirement for all key stakeholders.

C.4 Strengthening veterinary services

- A = No systematic approach at national level to strengthening Veterinary Services.
- B = Veterinary services assessed, and plans developed to improve capacity, through a structured approach such as OIE Performance of Veterinary Services (PVS) Evaluation and PVS Gap Analysis missions.
- C = Implementation of plan to strengthen capacity gaps in Veterinary Services underway.



- D = Monitoring of Veterinary Services performance carried out regularly, e.g. through PVS Evaluation Follow Up missions.
- E = Documented evidence of strong capacity in compliance with OIE standards on the quality of Veterinary Services.

D.1 National monitoring for antimicrobial use

D.1.1 Human sector

- A = No national plan or system for monitoring use of antimicrobials.
- B = System designed for surveillance of antimicrobial use, that includes monitoring national level sales or consumption of antibiotics in health services.
- C = Total sales of antimicrobials are monitored at national level and/or some monitoring of antibiotic use at sub-national level.
- D = Prescribing practices and appropriate antibiotic use are monitored in a national sample of healthcare settings.
- E = On a regular basis (every year/two years) data is collected and reported on:
 - a) Antimicrobial sales or consumption at national level for human use; and
 - b) Antibiotic prescribing and appropriate/rational use, in a representative sample of health facilities, public and private

D.1.2-D.1.4 Animal health, crop production and plant production

Animal health sector

- A = No national plan or system for monitoring sales/ use of antimicrobials in animals.
- B = Plan agreed for monitoring quantities of antimicrobials sold for/ used in animals, based on OIE standards⁵.
- C = Data collected and reported on total quantity of antimicrobials sold for/used in animals and their intended type of use (therapeutic or growth promotion).
- D = On a regular basis, data is collected and reported to the OIE on the total quantity of antimicrobials sold for/used in animals nationally, by antimicrobial class, by species (aquatic or terrestrial), method of administration, & by type of use (therapeutic/ growth promotion).
- E = Data on antimicrobials used under veterinary supervision in animals are available at farm level, for individual animal species.

Animal health and crop production

- A = No national plan or system for monitoring use of antimicrobials in animal or crop production.
- B = Plan agreed for monitoring quantities of antimicrobials used in animals, based on OIE standards.
- C = Implementation of plans to monitor sales, consumption and type of use (therapeutic or growth promotion).
- D = Data collected and reported on national sales or consumption of antimicrobials for animal production.
- E = On a regular basis, data is collected and reported

Plant production sector

- A = No national plan or system for monitoring use of pesticides used for the purpose of controlling bacteria or fungal diseases⁶.
- B = Plan agreed for monitoring quantities of pesticides used for the purpose of controlling bacteria or fungal diseases.

(C to E on 2017–2018)

- C = Data collected and reported on quantity of AM used in some subsectors of plant production.
- D = Data collected and reported on total quantity of AM used nationally in plant production.
- E = On a regular basis, data is collected and reported on total quantity of AM use in crop production, by AM class.

(C to D on 2018–2019)

- C = Data collected and reported on total quantity of pesticides sold/ used nationally for the purpose of controlling bacteria or fungal diseases.
- D = On a regular basis, data is collected and reported on quantity of pesticides sold/used in plant production for the purpose of controlling bacteria or fungal diseases, disaggregated by class of active ingredient



D.2 National surveillance system for AMR

D.2.1 Human sector

2016–2017, 2017–2018

- A = No capacity for generating data (antibiotic susceptibility testing and accompanying clinical and epidemiological data) and reporting on antibiotic resistance.
- B = AMR data is collated locally for common bacteria, but data collection may not use a standardized approach and lacks national coordination and/or quality management.
- C = National AMR surveillance activities are in place for common bacterial pathogens that link patient information with susceptibility testing, with a national reference laboratory that participates in external quality assurance.
- D = There is a functioning national AMR surveillance system covering antibiotics in hospitals and outpatient clinics, with external quality assurance, and a national coordinating center producing reports on resistance levels.
- E = The national AMR surveillance system integrates surveillance of AMR across sectors, and generates regular reports. The national surveillance system contributes data on AMR to the Global AMR Surveillance System (GLASS).

2018–2019

- A = No capacity for generating data (antibiotic susceptibility testing and accompanying clinical and epidemiological data) and reporting on antibiotic resistance.
- B = AMR data is collated locally for common bacteria, but data collection may not use a standardized approach and lacks national coordination and/or quality management.
- C = National AMR surveillance activities for common bacterial infections follow national standards, and a national reference laboratory that participates in external quality assurance.
- D = There is a functioning national AMR surveillance system covering common bacterial infections in hospitalized and community patients, with external quality assurance, and a national coordinating center producing reports on AMR.
- E = The national AMR surveillance system integrates surveillance of AMR across sectors, and generates regular reports covering at least one common indicator.

D.2.2-D.2.6 Animal, food, plant and environment

2016–2017

- A = No national plan or system for monitoring AMR in animals, food and agricultural production.
- B = AMR data is collected locally but may not use a standardized approach and lacks national coordination and/or quality assurance. Priority pathogens have been identified for surveillance.
- C = Studies available on levels of resistance in at least 2 pathogens relevant for animals.
- D = National system of surveillance of AMR established for relevant animal pathogens which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.
- E = Data collected and reported on a regular basis on AMR in relevant pathogens for animals and in food.

2017–2018

- A = No national plan for a system of monitoring of AMR is available.
- B = National plan for monitoring AMR but capacity (including laboratory) for surveillance and reporting data on AMR is lacking.
- C = Some AMR data is collected locally but may not use a standardized approach and lacks national coordination and/or quality management.
- D = Priority pathogenic/ commensal bacterial species have been identified for surveillance. Data systematically collected and reported on levels of resistance in at least 2 of those bacterial species, involving a laboratory that follows quality management processes, e.g. proficiency testing.
- E = National system of surveillance of AMR established for priority pathogens and for relevant commensal bacteria which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.

2018–2019

- A = No national plan for a system of surveillance of AMR is available.
- B = National plan for surveillance of AMR but capacity (including laboratory and for reporting data on AMR) is lacking.



- C = Some AMR data is collected locally but may not use a standardized approach and lacks national coordination and/or quality management.
- D = Priority pathogenic/ commensal bacterial (in animal) or priority food borne pathogenic/ indicator bacterial species (in food), which have been identified for surveillance. Data systematically collected and reported on levels of resistance in at least 1 of those bacterial species, involving a laboratory that follows quality management processes, e.g. proficiency testing.
- E = National system of surveillance of AMR established for priority animal pathogens, zoonotic and commensal bacterial isolates (in animal), priority foodborne pathogens (in food), and/or relevant indicator bacteria which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.

D.4 Laboratory network in AMR surveillance system

D.4.1 Laboratory integration

- A = Information not available.
- B = Laboratories perform antimicrobial susceptibility testing (AST) for own purposes and are not included in the national AMR surveillance system.
- C = Some laboratories performing AST are integrated in the national AMR surveillance system.
- D = All laboratories performing AST are integrated in the AMR surveillance system but the role should be better formalized and the network better and developed.
- E = All laboratories performing AST are integrated in the national AMR surveillance system, have a clear position, and are linked to a national network coordinated by a National Reference Laboratory.

D.4.2 Relevance of diagnostic techniques

- A = Information not available.
- B = AST, bacterial isolation and identification protocols are not relevant or specific to the national AMR surveillance objectives.
- C = Major modifications in the AST, bacterial isolation and identification protocols used are required to improve their adaptation to national AMR surveillance objectives.
- D = Minor modifications in the AST, bacterial isolation and identification protocols used would improve their adaptation to the national AMR surveillance objectives.
- E = AST, bacterial isolation and identification protocols are perfectly suited to the national AMR surveillance objectives.

D.4.3 Standardization and harmonization of procedures

- A = Information not available.
- B = No standardized national AST guidelines are in place or less than 30% laboratories follow the same AST guidelines.
- C = Between 30% to 79% of laboratories follow the same AST guidelines.
- D = Over 80% of laboratories use the same AST guidelines.
- E = 100% of laboratories use the same AST guidelines.

D.4.4 Data management

- A = Information not available.
- B = AST data are handled manually, or AST data management is not computerized in all laboratories of the network and/or there are problems in the recording of the samples and their traceability along the analysis chain.
- C = Most laboratories of the network use computers to manage part of their data but major improvements in the system are required.
- D = Some minor improvements may be made in some laboratories of the network for the computerized management of laboratory data (computerized transmission of data, input procedures, sample storage information, etc.).
- E = All laboratories use optimal data management (e.g. samples and test results are identified using a complete computerized management system covering each step in the analysis chain, including the storage of epidemiological information, data validation protocol and the computerized transmission of results, conforming perfectly to the requirements of the national AMR surveillance system).

E.1 IPC in human health care

- A = No national IPC programme or operational plan is available.



- B = A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C = A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D = National IPC programme available according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E = IPC programmes are in place and functioning at national and health facility levels according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.

E.2 Good health, management and hygiene practices (E.2.1-E.2.9)

Animal and Food Production (2016–2017)

- A = No systematic efforts to improve infection prevention in the animal and food production sectors related to reducing use of antimicrobials.
- B = Plan agreed to promote farm hygiene, increase vaccination, biosecurity and appropriate handling of sick animals to prevent transmission of resistant bacteria to other animals and humans.
- C = Implementation of plan for infection prevention in food producing animals for some species, types of farms or geographical areas based on intergovernmental standards. Practical guidance developed and disseminated.
- D = Nationwide implementation of plan for infection prevention in animals in public and private sectors and in collaboration with veterinarians.
- E = Monitoring of progress on infection prevention relevant to reducing use of antimicrobials in animals, veterinary practices and food chains, with updating of plans and guidance in response to findings.

Animal, Plan, and Food Production (2017–2018, 2018–2019)

- A = No systematic efforts to improve good production practices.
- B = Some activities in place to develop and promote good production practices.
- C = National plan agreed to ensure good production practices in line with international standards (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius). Nationally agreed guidance for good production practices developed, adapted for implementation at local farm and food production level.
- D = Nationwide implementation of plan to ensure good production practices and national guidance published and disseminated.
- E = Nationwide implementation of plan to ensure good production practices and monitoring of impact on level of AMR, on animal health and welfare, and on production, with updating of plans and guidance in response to findings.

Food Processing (2018–2019)

- A = No systematic efforts to improve good management and hygiene practices.
- B = Some activities in place to develop and promote good management and hygiene practices.
- C = National plan agreed to ensure good management and hygiene practices in line with international standards (e.g. Codex Alimentarius). Nationally agreed guidance for good practices developed, and adapted for implementation according to local food processing approaches.
- D = Nationwide implementation of plan to ensure good management and hygiene practices and national guidance published and disseminated.

F.2 Antimicrobial use and antimicrobial stewardship

F.2.1 Human sector

2016–2017

- A = No/weak national policy & regulations for antimicrobial stewardship
- B = National policy and regulations for antimicrobial stewardship developed & approved, that address use, availability and quality of antibiotics in the community and in health care settings.
- C = National antimicrobial stewardship program is being implemented in some healthcare facilities. Planned legal/regulatory changes are being introduced to regulate access to antibiotics for human use.



- D = Antimicrobial stewardship program is implemented in health care facilities nationwide. Legal/regulatory changes approved and publicized to regulate sales and products for human use, but not fully enforced. Antibiotic quality testing program operational.
- E = Antimicrobial stewardship program is implemented in most health care facilities and in community. Regulations are enforced on access to antibiotics and use in human health. Monitoring and surveillance results are used to inform action and to update treatment guidelines and essential medicines lists.

2017–2018, 2018–2019

- A = No/weak national policies for appropriate use.
- B = National policies for antimicrobial governance developed for the community and health care settings.
- C = Practices to assure appropriate antimicrobial use being implemented in some healthcare facilities and guidelines for appropriate use of antimicrobials available.
- D = Guidelines and other practices to enable appropriate use are implemented in most health facilities nationwide. Monitoring and surveillance results are used to inform action and to update treatment guidelines and essential medicines lists.
- E = Guidelines on optimizing antibiotic use are implemented for all major syndromes and data on use is systematically fed back to prescribers.

F.2.2-F.2.4 Animal health, crop production and plant health

2016–2017

- A = No national policy or legislation regarding the quality and efficacy of antimicrobials and their use in animals, and crops.
- B = National policy for antimicrobial stewardship and governance developed, that addresses appropriate use, availability and quality of antimicrobials for animal use.
- C = Legislation and regulations approved on import, marketing authorization, production, distribution and prudent use of high-quality veterinary medicinal products including antimicrobials, based on international standards.
- D = Implementation of legislation and regulations on responsible and prudent use of antimicrobials in animals and ensuring safe food supplies. Prescriptions are required for antimicrobial use in animals. Use of antimicrobials for animal growth promotion has been phased out.
- E = Antimicrobials given to animals are only used to control or treat infectious diseases, under veterinary supervision. Regulations are enforced on access to antimicrobials and their use in animals, crop production, and to otherwise prevent food contamination with antimicrobial residues in compliance with Codex Alimentarius standards.

2017–2018

- A = No national policy or legislation regarding the quality, safety and efficacy of antimicrobial products, and their distribution, sale or use.
- B = National legislation covers some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
- C = National legislation covers all aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
- D = Effective enforcement processes and control are in place to ensure compliance with legislation.
- E = Guidelines for responsible and prudent use of antimicrobials based on international standards (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius) are available according to animal species and/or production sector and include restriction of specific antimicrobial classes listed as Critically Important for humans and animals.

2018–2019

- A = No national policy or legislation regarding the quality, safety and efficacy of antimicrobial products, and their distribution, sale or use.
- B = National legislation covers some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
- C = National legislation covers all aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.



D = The national regulatory framework³ for AM products incorporates all the elements included in the related international standards on responsible and prudent use of antimicrobials (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius) according to animal species and/or production sector.

E = Enforcement processes and control are in place to ensure compliance with legislation.

G.2 Indicator code

1. Raising awareness and understanding of antibiotic resistance risks and response in human health
2. Training and professional education on AMR in the human health sector
3. National monitoring system for consumption and rational use of antimicrobials in human health
4. National surveillance system for antimicrobial resistance (AMR) in humans
5. Infection Prevention and Control (IPC) in human health care
6. Optimizing antimicrobial use in human health
7. Raising awareness and understanding of AMR risks and response in animal health, plant health, food production, food safety, and environment sectors
8. Training and professional education on AMR in the veterinary sector
9. Training and professional education on AMR in farming sector (animal and plant), food production, food safety and the environment
10. Progress with strengthening veterinary services
11. National monitoring system for antimicrobials intended to be used in animals (sales/use)
12. National monitoring system for antimicrobial use (antibiotic and antifungal agents) in plant production
13. National surveillance system for antimicrobial resistance (AMR) in animals, plants, foods and environment
14. Good health, management and hygiene practices to reduce the use of antimicrobials in animal and plant production and AMR transmission in food production
15. Optimizing antimicrobial use in animal and plant health
16. Legislation and/or regulations to prevent contamination of the environment with antimicrobials

3 Including legislation, standards, guidelines and other regulatory instruments



Annex 3

TrACSS indicators (2016–2017, 2017–2018 and 2018–2019)

Table 15: Map of indicators for monitoring regional progress in addressing AMR (2016–2017, 2017–2018 and 2018–2019)

Topic and subject area		Indicators		
		2016–2017	2017–2018	2018–2019
Multisectoral approach to addressing AMR	Multisector and One Health collaboration/coordination ⁴	4.1 Multisector and One Health working arrangements	4.1. Multisector and One Health collaboration/coordination	4.1 Multisector and One Health collaboration/coordination
	Sector involvement in NAP-AMR		4.2. Which sectors are actively involved in developing and implementing the AMR National Action Plan [human health]	4.2 Which sectors are actively involved in developing and implementing the AMR National Action Plan [human health]
			4.2. Which sectors are actively involved in developing and implementing the AMR National Action Plan [animal health (terrestrial and aquatic)]	4.2 Which sectors are actively involved in developing and implementing the AMR National Action Plan [animal Health (terrestrial and aquatic)]
			4.2. Which sectors are actively involved in developing and implementing the AMR National Action Plan [plant health]	4.2 Which sectors are actively involved in developing and implementing the AMR National Action Plan [plant health]

4. • Grey shading relates to multi-sectoral issues for 2017–2018 and 2018–2019 (included environment in 2016–2017)
- Orange shading denotes questions on human health aspects of AMR (2016–2017, 2017–2018, and 2018–2019)
- Blue shading denotes animal health for 2017–2018 and 2018–2019 (included agriculture in 2016–2017)
- Green shading relates to plant health and environment (2017–2018 and 2018–2019)



Topic and subject area		Indicators		
		2016–2017	2017–2018	2018–2019
Country progress with development of a national action plan on AMR			4.2. Which sectors are actively involved in developing and implementing the AMR National Action Plan [Food production]	4.2 Which sectors are actively involved in developing and implementing the AMR National Action Plan [food production]
			4.2. Which sectors are actively involved in developing and implementing the AMR National Action Plan [food safety]	4.2 Which sectors are actively involved in developing and implementing the AMR National Action Plan [food safety]
			4.2. Which sectors are actively involved in developing and implementing the AMR National Action Plan [environment]	4.2 Which sectors are actively involved in developing and implementing the AMR National Action Plan [environment including WASH*]
			5.1. Country progress with development of a national action plan on AMR	5.1 Country progress with development of a national action plan on AMR
	Country progress with development of a national action plan on AMR	5.1 Country progress with development of a national action plan on AMR	5.2. Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases	



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
		5.2.1. If so, please select the relevant item from the drop-down menu (mark all diseases that are relevant) [HIV]	5.2 Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases [HIV]
		5.2.1. If so, please select the relevant item from the drop-down menu (mark all diseases that are relevant) [tuberculosis]	5.2 Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases [tuberculosis]
		5.2.1. If so, please select the relevant item from the drop-down menu (mark all diseases that are relevant) [malaria]	5.2 Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases [malaria]
		5.2.1. If so, please select the relevant item from the drop-down menu (mark all diseases that are relevant) [neglected tropical diseases]	5.2 Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases [neglected tropical diseases]



Topic and subject area		Indicators		
		2016–2017	2017–2018	2018–2019
	Country legislations on antimicrobial use			5.3 If you have published your AMR national action plan, please insert a link here
				5.4 Country policies and regulation on antimicrobial use [country has laws or regulations on prescription and sale of antimicrobials, for human use]
				5.4 Country policies and regulation on antimicrobial use [country has laws or regulations on prescription and sale of antimicrobials for animal use]
				5.4 Country policies and regulation on antimicrobial use [Country has laws or regulations that prohibits the use of antibiotics for growth promotion in the absence of risk analysis]
	Country progress on strategic objective 1: Improve awareness and understanding of AMR through effective communication, education and training	6.1 Raising awareness and understanding of AMR risks and response in human health	6.1. Raising awareness and understanding of antibiotic resistance risks and response in human health	6.1 Raising awareness and understanding of AMR risks and response
				6.1.1 For the level selected above, please indicate the extent of involvement of the sectors below [human health]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
	6.2 Raising awareness and understanding of AMR risks and response in animal health and food production	6.2. Raising awareness and understanding of AMR risks and response in animal health, plant health, food production, food safety, and environment sectors	
		6.2.1. For each of the following sectors, please indicate which statement in 6.2 above (A-E) is applicable [animal health (terrestrial and aquatic)]	6.1.1 For the level selected above, please indicate the extent of involvement of the sectors below [animal health (terrestrial and aquatic)]
		6.2.1. For each of the following sectors, please indicate which statement in 6.2 above (A-E) is applicable: [plant health]	6.1.1 For the level selected above, please indicate the extent of involvement of the sectors below [plant health]
		6.2.1. For each of the following sectors, please indicate which statement in 6.2 above (A-E) is applicable [food production]	6.1.1 For the level selected above, please indicate the extent of involvement of the sectors below [food production]
		6.2.1. For each of the following sectors, please indicate which statement in 6.2 above (A-E) is applicable [food safety]	6.1.1 For the level selected above, please indicate the extent of involvement of the sectors below [food safety]

Topic and subject area		Indicators		
		2016–2017	2017–2018	2018–2019
Country progress on strategic objective 2: Strengthen the knowledge and evidence base through surveillance and research			6.2.1. For each of the following sectors, please indicate which statement in 6.2 above (A-E) is applicable [environment]	6.1.1 For the level selected above, please indicate the extent of involvement of the sectors below [environment including WASH]
	Training and professional education on AMR in the human health sector	6.3 Training and professional education on AMR in the human health sector	6.3. Training and professional education on AMR in the human health sector	6.2 Training and professional education on AMR in the human health sector
	Training and professional education on AMR in the veterinary sector	6.4 Training and professional education on AMR in the veterinary sector	6.4. Training and professional education on AMR in the veterinary sector	6.3 Training and professional education on AMR in the veterinary sector
	Training and professional education on AMR in farming sector (animal and plant), food production, food safety and the environment		6.5. Training and professional education on AMR in farming sector (animal and plant), food production, food safety and the environment	6.4 Training and professional education on AMR in farming sector (animal and plant), food production, food safety and the environment
	Progress with strengthening veterinary services	6.5 Progress with strengthening veterinary services	6.6. Progress with strengthening veterinary services	6.5 Progress with strengthening veterinary services
	National monitoring system for consumption and rational use of antimicrobials in human health	7.1 National monitoring system for consumption and rational use of antimicrobials in human health	7.1. National monitoring system for consumption and rational use of antimicrobials in human health	7.1 National monitoring system for consumption and rational use of antimicrobials in human health



Topic and subject area		Indicators		
		2016–2017	2017–2018	2018–2019
	National monitoring system for antimicrobials intended to be used in animals (sales/use)	7.2 National monitoring system for antimicrobial use in animals and crop production	7.2. National monitoring system for antimicrobials intended to be used in animals (sales/use)	7.2 National monitoring system for antimicrobials intended to be used in animals (sales/use)
	National monitoring system for antimicrobial use in plant production		7.3. National monitoring system for antimicrobial use (antibiotic and antifungal agents) in plant production	7.3 National monitoring system for pesticide use in plant production
	National surveillance system for antimicrobial resistance (AMR) in humans	7.3 National surveillance system for antimicrobial resistance (AMR) in humans	7.4. National surveillance system for antimicrobial resistance (AMR) in humans	7.4 National surveillance system for antimicrobial resistance (AMR) in humans
	National surveillance system for antimicrobial resistance (AMR) in animals, plants, foods and the environment	7.4 National surveillance system for antimicrobial resistance (AMR) in animals and foods	7.5. National surveillance system for antimicrobial resistance (AMR) in animals, plants, foods and environment	7.5 (a) National surveillance system for antimicrobial resistance (AMR) in animals (terrestrial and aquatic)
			7.5.1. For each of the following sources of bacteria, please indicate which statement in 7.5 above (A-E) is applicable: [animals (terrestrial and aquatic)]	7.5 (b) AMR surveillance is routinely undertaken in animals for the following categories [animal (terrestrial and/or aquatic) isolates linked to animal disease]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
		7.5.1. For each of the following sources of bacteria, please indicate which statement in 7.5 above (A-E) is applicable: [plants]	7.5 (b) AMR surveillance is routinely undertaken in animals for the following categories [zoonotic pathogenic bacteria]
		7.5.1. For each of the following sources of bacteria, please indicate which statement in 7.5 above (A-E) is applicable: [food]	7.5 (b) AMR surveillance is routinely undertaken in animals for the following categories [commensal isolates]
		7.5.1. For each of the following sources of bacteria, please indicate which statement in 7.5 above (A-E) is applicable: [environment]	7.5 (b) AMR surveillance is routinely undertaken in animals for the following categories: [ESBL producing indicator <i>E. coli</i> obtained from healthy animals in key food producing species]
			7.5 (c) National surveillance system for antimicrobial resistance (AMR) in food (animal and plant origin)
			7.5 (d) AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [A- Foodborne pathogenic bacteria] [Scale 1]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			7.5 (d) AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [A - foodborne pathogenic bacteria] [Scale 2]
			7.5 (d) AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [B - Indicator bacteria] [Scale 1]
			7.5 (d) AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [B - Indicator bacteria] [Scale 2]
			7.6 Multisectoral working group or coordination committee in charge of national AMR strategy reviews data on antimicrobial consumption and resistance in human and animal sectors at least annually, considers implications for and amends national strategy accordingly [for human health]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			7.6 Multisectoral working group or coordination committee in charge of national AMR strategy reviews data on antimicrobial consumption and resistance in human and animal sectors at least annually, considers implications for and amends national strategy accordingly [for animal health]
			7.7 National AMR Laboratory Network in animal health and food safety sectors+
			7.7 a) Effective integration of laboratories in the AMR surveillance
			7.7 b) Level of the standardization and harmonization of procedures among laboratories included in the AMR surveillance system
			7.7 c) Relevance of diagnostic techniques used by laboratories included in the AMR surveillance system
			7.7 d) Technical level of data management of the laboratory network in the AMR surveillance system



Topic and subject area		Indicators		
		2016–2017	2017–2018	2018–2019
Country progress on Strategic Objective 3: Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures.	Infection prevention and control (IPC) in human health care	8.1 Infection prevention and control (IPC) in human health care	8.1. Infection prevention and control (IPC) in human health care	8.1 Infection prevention and control (IPC) in human health care
	Good health, management and hygiene practices to reduce the use of antimicrobials in animal and plant production and AMR transmission in food production	8.2 Good animal health and management practices and good hygiene to prevent infections to reduce the use of antimicrobials in animals and AMR transmission in food production	8.2. Good health, management and hygiene practices to reduce the use of antimicrobials in animal and plant production and AMR transmission in food production 8.2.1. For each of the following sectors, please indicate which statement in 8.2 above (A-E) is applicable: [animal health] 8.2.1. For each of the following sectors, please indicate which statement in 8.2 above (A-E) is applicable: [plant health] 8.2.1. For each of the following sectors, please indicate which statement in 8.2 above (A-E) is applicable: [food production]	8.2 Good health, management and hygiene practices to reduce the use of antimicrobials and minimize development and transmission of AMR in animal production (terrestrial and aquatic)



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
Coverage with critical measures (water supplies, sanitation, hygiene and immunization) to reduce spread of infections in communities and health care facilities		8.2.1. For each of the following sectors, please indicate which statement in 8.2 above (A-E) is applicable: [food safety]	
		8.2.1. For each of the following sectors, please indicate which statement in 8.2 above (A-E) is applicable: [environment]	
	8.3 Coverage with critical measures to reduce infection. Estimated national coverage with critical measures to reduce infection	8.3 Good management and hygiene practices to reduce the development and transmission of AMR in food processing	
		8.3 Coverage with critical measures (water supplies, sanitation, hygiene and immunization) to reduce spread of infections in communities and health-care facilities	8.4 Coverage with critical measures (water supplies, sanitation, hygiene and immunization) to reduce spread of infections in communities and health-care facilities
		8.3.1. Estimated national immunization coverage rate of pneumococcus vaccine – latest coverage in %	
		8.3.2. Estimated national immunization coverage rate of pneumococcus vaccine – latest coverage year	



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
		8.3.3. Estimated national immunization coverage rate of Haemophilus influenzae type B (HiB) vaccine – latest national coverage rate in %	
		8.3.4. Estimated national immunization coverage rate of Haemophilus influenzae type B vaccine – latest coverage Year	
		8.3.5. Estimated national proportion of health-care facilities with basic* water supplies – latest national coverage rate in %	
		8.3.6. Estimated national proportion of health-care facilities with basic* water supplies – latest coverage year	
		8.3.7. Estimated national proportion of health-care facilities with basic* hand hygiene facilities – latest national coverage rate in %	



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
Country progress on Strategic Objective 4: Optimize the use of antimicrobial medicines in human, animal and plant health		8.3.8. Estimated national proportion of health-care facilities with basic* hand hygiene facilities – latest coverage year	
		8.3.9. Estimated national proportion of health care facilities with functional sanitation facilities – latest national coverage rate in %	
		8.3.10. Estimated national proportion of health care facilities with functional sanitation facilities – latest coverage year	
	9.1 Antimicrobial Stewardship & regulation in human health	9.1. Optimizing antimicrobial use in human health	9.1 Optimizing antimicrobial use in human health
	Optimizing antimicrobial use in animal and plant health	9.2. Optimizing antimicrobial use in animal and plant health	9.2 Optimizing antimicrobial use in animal health (terrestrial and aquatic)
		9.2.1. For each of the following sectors, please indicate which statement in 9.2 above (A-E) is applicable: [animal health (terrestrial and aquatic)]	



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
Legislation and/or regulations to prevent contamination of the environment with antimicrobials		9.2.1. For each of the following sectors, please indicate which statement in 9.2 above (A-E) is applicable: [Plant Health]	
		9.3. Legislation and/or regulations to prevent contamination of the environment with antimicrobials*	9.3 Legislation and/or regulations to prevent contamination of the environment with antimicrobials (include 5.4 Country policies and regulation on antimicrobial use [country has laws or regulations on prescription and sale of antimicrobials, for human use, animal use, and growth promotion in the absence of risk analysis])
		9.4. Country use policy and regulatory status [country has regulations on prescription and sale of antimicrobials, including requirements for prescriptions for human use]	
		9.4. Country use policy and regulatory status [country does not authorize use of human and animal critically Important antimicrobials for growth promotion*]	
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [areas of a low community access to safe water and sanitation] [have high-risk locations been identified]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			<p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Areas of a low community access to safe water and sanitation] [are risk reduction actions underway]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [areas of a low community access to safe water and sanitation] [That specifically addresses AMR+]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Areas of a low community access to safe water and sanitation] [that impacts AMR#]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Areas of a low community access to safe water and sanitation] [that has a functioning system for monitoring compliance and enforcement]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human health facilities without access to safe water supply and sanitation] [have high risk locations been identified]</p>



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Human health facilities without access to safe water supply and sanitation] [are risk reduction actions underway]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Human health facilities without access to safe water supply and sanitation] [that specifically addresses AMR+]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human health facilities without access to safe water supply and sanitation] [that impacts AMR#]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Human health facilities without access to safe water supply and sanitation] [that has a functioning system for monitoring compliance and enforcement]

Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human sewage (including wastewater and sludge) quality) disposal in the environment][Have high-risk locations been identified]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human sewage (including wastewater and sludge) quality) disposal in the environment] [are risk reduction actions underway]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Human sewage (including wastewater and sludge) quality) disposal in the environment] [that specifically addresses AMR+]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human sewage (including wastewater and sludge) quality) disposal in the environment] [that impacts AMR#]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			<p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Human sewage (including wastewater and sludge) quality disposal in the environment] [that has a functioning system for monitoring compliance and enforcement]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human sewage (including wastewater and sludge) quality reuse] [have high-risk locations been identified]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Human sewage (including wastewater and sludge) quality reuse] [are risk reduction actions underway]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human sewage (including wastewater and sludge) quality reuse] [that specifically addresses AMR+]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human sewage (including wastewater and sludge) quality reuse] [that impacts AMR#]</p>



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [human sewage (including wastewater and sludge) quality reuse] [that has a functioning system for monitoring compliance and enforcement]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from health facilities for disposal in the environment] [have high-risk locations been identified]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Wastewater discharges from health facilities for disposal in the environment] [are risk reduction actions underway]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from health facilities for disposal in the environment] [that specifically addresses AMR+]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from health facilities for disposal in the environment] [that impacts AMR#]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from health facilities for disposal in the environment] [that has a functioning system for monitoring compliance and enforcement]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and disposal into the environment] [have high-risk locations been identified]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and disposal into the environment] [are risk reduction actions underway]

Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			<p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [Discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and disposal into the environment] [that specifically addresses AMR+]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and disposal into the environment] [that impacts AMR#]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and disposal into the environment] [that has a functioning system for monitoring compliance and enforcement]</p> <p>10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and re-use] [have high risk locations been identified]</p>



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and re-use] [are risk reduction actions underway]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and re-use] [that specifically addresses AMR+]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and re-use] [that impacts AMR#]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [discharges from intensive animal (terrestrial and aquatic) production (liquid waste and manure) and re-use] [that has a functioning system for monitoring compliance and enforcement]

Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from manufacturing sites for antimicrobial agents (either as active pharmaceutical ingredient (API) or finished products)] [have high risk locations been identified]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from manufacturing sites for antimicrobial agents (either as API or finished products)] [are risk reduction actions underway]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from manufacturing sites for antimicrobial agents (either as API or finished products)] [that specifically addresses AMR+]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from manufacturing sites for antimicrobial agents (either as API or finished products)] [that impacts AMR#]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [wastewater discharges from manufacturing sites for antimicrobial agents (either as API or finished products)] [that has a functioning system for monitoring compliance and enforcement]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of unused medicines antimicrobial agents*] [have high-risk locations been identified]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of unused medicines antimicrobial agents*] [are risk reduction actions underway]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of unused medicines antimicrobial agents*] [that specifically addresses AMR+]

Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of unused medicines antimicrobial agents*] [that impacts AMR#]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of unused medicines antimicrobial agents*] [that has a functioning system for monitoring compliance and enforcement]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of products contaminated with AM residues**] [have high-risk locations been identified]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of products contaminated with AM residues**] [are risk reduction actions underway]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of products contaminated with AM residues**] [that specifically addresses AMR+]



Topic and subject area	Indicators		
	2016–2017	2017–2018	2018–2019
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of products contaminated with AM residues**] [that impacts AMR#]
			10. Legislation and/or regulations to prevent contamination of the environment with antimicrobials [disposal of products contaminated with AM residues**] [that has a functioning system for monitoring compliance and enforcement] ²

5. • Grey shading relates to multisectoral issues for 2017–2018 and 2018–2019 (included environment in 2016–2017)
- Orange shading denotes questions on human health aspects of AMR (2016–2017, 2017–2018, and 2018–2019)
 - Blue shading denotes animal health for 2017–2018 and 2018–2019 (included agriculture in 2016–2017)
 - Green shading relates to plant health and environment (2017–2018 and 2018–2019)

Table 16: Map of indicators for overall implementation and monitoring
(2016–2017, 2017–2018, 2018–2019)

Description of indicators		Category	Indicator code		
			2016–2017	2017–2018	2018–2019
1	Raising awareness and understanding of antibiotic resistance risks and response in human health	Human related	6.1	6.1	6.1.1
2	Training and professional education on AMR in the human health sector	Human related	6.3	6.3	6.2
3	National monitoring system for consumption and rational use of antimicrobials in human health	Human related	7.1	7.1	7.1
4	National surveillance system for antimicrobial resistance in humans	Human related	7.3	7.4	7.4
5	Infection prevention and control (IPC) in human health care	Human related	8.1	8.1	8.1
6	Optimizing antimicrobial use in human health	Human related	9.1	9.1	9.1
7	Raising awareness and understanding of AMR risks and response in the animal health, plant health, food production, food safety and environment sectors	Non-human related	6.2	6.2, 6.2.1	6.1.1
8	Training and professional education on AMR in the veterinary sector	Non-human related	6.4	6.4	6.3
9	Training and professional education on AMR in the farming sector (animal and plant), food production, food safety and the environment	Non-human related	N/A	6.5	6.4
10	Progress with strengthening veterinary services	Non-human related	6.5	6.6	6.5
11	National monitoring system for antimicrobials intended to be used in animals (sales/use)	Non-human related	7.2	7.2	7.2
12	National monitoring system for antimicrobial use (antibiotic and antifungal agents) in plant production	Non-human related	7.2	7.3	7.3
13	National surveillance system for antimicrobial resistance (AMR) in animals, plants, foods and environment	Non-human related	7.4	7.5, 7.5.1	7.5.(a), 7.5.(c)
14	Good health, management and hygiene practices to reduce the use of antimicrobials in animal and plant production and AMR transmission in food production	Non-human related	8.2	8.2, 8.2.1	8.2, 8.3
15	Optimizing antimicrobial use in animal and plant health	Non-human related	9.2	9.2, 9.2.1	9.2
16	Legislation and/or regulations to prevent contamination of the environment with antimicrobials	Non-human related	9.3	9.3	N/A



Overuse and misuse of antimicrobials in humans, animals and plants has accelerated the natural evolutionary processes of antimicrobial resistance (AMR), leading to untreatable microbial infection that poses a grave threat to human health and economic development. In addressing AMR, the Global Tripartite AMR Country Self-Assessment Survey (TrACSS) is a component of the broader approach to monitor and evaluate the implementation of the Global Action Plan (GAP) and national action plans (NAP) on AMR.

This report analyses and compares responses of countries to the first (2016–2017), second (2017–2018) and third (2018–2019) wave of TrACSS, and describes trends and current levels of regional and country progress, based on self-assessment, in addressing AMR among Member States of the WHO South-East Asia Region. It is intended to encourage national-level reviews of country progress, identify priorities for next steps and areas where support is required, and stimulate discussions on how to enhance AMR containment. This will enable effective and sustainable multisectoral response on AMR in countries. This report will not only be useful for policy-makers but also for multisectoral programme coordinators, researchers and practitioners.

This report evaluates six main areas that encompass the objectives of GAP-AMR and NAP-AMR: development of NAPs; multisectoral approaches to addressing AMR; improving awareness; strengthening the knowledge and evidence base through surveillance and research; reducing incidence of infection through effective sanitation and prevention measures; and optimizing the use of antimicrobial medicines in human, animal and plant health. Each chapter outlines both regional and country-level progress based on the results of three rounds of AMR national self-assessment surveys.



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